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This Air Program Strategy for Attainment and Maintenance of Ambient Air Quality Standards states EPA's strategy for implementation of the Clean Air Act's requirements for compliance with ambient air quality standards, to be achieved principally through adherence to air quality-based emission limitations. This strategy also applies to the control of pollutants less pervasive than those covered by air quality standards. These less pervasive pollutants are generally subject to direct emission-oriented controls.

This document contains a statement of the Agency's objectives and plans for future air pollution control efforts, based on the requirements and philosophy of the Clean Air Act and on the national status of air pollution control. This document should be considered both as a status report and as an outline of directions for the future.

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Preface

This Air Program Strategy for Attainment and Maintenance of Ambient Air Quality Standards states EPA's strategy for implementation of the Clean Air Act's requirements for compliance with ambient air quality standards, to be achieved principally through adherence to air quality-based emission limitations. This strategy also applies to the control of pollutants less pervasive than those covered by air quality standards. These less pervasive pollutants are generally subject to direct emission-oriented controls.

The discussion which follows is a statement of the Agency's objectives and plans for future air pollution control efforts, based on the requirements and philosophy of the Clean Air Act and on the national status of air pollution control. This document should be considered both as a status report and as an outline of directions for the future.

The discussion is not intended as a complete statement of the Environmental Protection Agency's air pollution control program; it is related primarily to the operational objectives and programs of the Agency and the requisite companion programs of the States in achieving the Clean Air Act's goals. Thus, the discussion does not cover the Agency's substantial effort to define health effects, welfare effects, control technology for mobile and stationary sources, or the definition of mechanisms for atmospheric transportation of pollutants, nor is it an exhaustive compendium of all matters related to air pollution control.

AIR PROGRAM STRATEGY FOR THE ATTAINMENT AND MAINTENANCE OF AMBIENT AIR QUALITY STANDARDS AND CONTROL OF OTHER POLLUTANTS

I. Introduction

A. Overview

The 1970 Amendments to the Clean Air Act have been considered a landmark in the nation's efforts to control air pollution both in terms of their comprehensiveness and in terms of their setting forth the institutional framework for State and Federal action. Pursuant to that Act, National Ambient Air Quality Standards were established for six significant and widespread air pollutants, implementation plans for the attainment and maintenance of these standards were developed by the States, a program for the establishment of Federal emission standards for significant new air pollution sources and for hazardous air pollutants was initiated, and statutorily specified limitations on emissions from light duty motor vehicles were imposed.

The Clean Air Act's fundamental goal is the protection of public health and welfare from the effects of air pollution. This goal is to be attained through: the restoration of unhealthy air (and its preservation, once restored) to at least acceptable status through State controls on stationary sources and transportation systems and Federal controls on new motor vehicles; clean air is to be preserved from unnecessary and significant degradation; future increases in emissions are to be minimized in an equitable manner (that does not put particular regions of the country at a competitive disadvantage or advantage) through Federal new source emissions limits based on best technology (considering cost); and national emission limits are to be set for the strict control of hazardous localized pollution problems. In achieving these goals, the Act recognizes the high priority need for State control actions.

The Act, in general, envisions the development and implementation of air pollution controls as a State responsibility, with the Federal government setting minimally acceptable criteria for assuring that public health and welfare are adequately protected. For all cases in which the Federal government has not set standards, the States are free to impose whatever controls they see fit. For cases in which the Federal government has set controls, the States may establish a more stringent requirement but may not set a more lenient requirement. The Act largely reserves to the Federal government the control of new motor vehicles, and also places on it primary responsibility for the control of hazardous pollutants and the setting of emissions standards for new significant stationary sources. In the case of both hazardous emissions standards and new stationary sources controls the States may request the delegation of enforcement responsibilities. Given the policy of State primacy in the Act, it has been EPA policy to defer to the States and to take action (generally after extensive consultation with States) only in cases of State failure to act or in cases where Federal action is directly indicated.

The past six years have served as a major testing ground for both the fundamental goals of the Act and the institutional arrangements contemplated for their achievement.

Six years after the passage of the Act, violations of the National Ambient Air Quality Standards for one or more pollutants still exist in at least 160 of the 247 air quality control regions. These standards were to have been attained in the 1973-1975 time frame. Yet substantial progress has been made:

- The estimated number of people exposed to total suspended particulates in excess of the annual primary standard decreased from 73 million in 1970 to less than 50 million in 1975, i.e., the exposed population has been reduced by more than one-third since the passage of the Clean Air Act.

- The concentrations of sulfur dioxide in urban areas have decreased by an average of 30 percent since 1970. Only a few monitors in a small number of urban areas report violations of standards.

- At monitoring sites where data exist covering three or more years, some 80 percent show improvement in measured levels of carbon monoxide.

Outside of California, monitoring data for oxidants and nitrogen dioxide are inadequate to characterize trends since the passage of the

Clean Air Act. With more stringent automobile standards, some improvement in oxidant levels would be expected. However, widespread violations of one-hour ambient air quality standards are reported and the problem of hydrocarbon emission remains as one of the more pressing priorities in air pollution control. With respect to nitrogen dioxide, the reverse is true. Only limited controls over stationary source emissions have been imposed and no Federal limits for emissions from new motor vehicles existed prior to the 1973 model year. With increased energy consumption, the trends in ambient levels of nitrogen dioxide would be expected to be up. However, in contrast to oxidants, very few areas have violations of the ambient air quality standards. Control considerations with respect to nitrogen dioxide are, in general, ones more of prevention of future pollution problems than of remedial action directed at current levels.

Other air pollutants that have been of traditional concern, such as polycyclic organic matter (POM), show decreasing trends in ambient air concentrations. These trends are generally due to the imposition of controls under the State Implementation Plans for other pollutants (e.g., general particulate control leads to reductions in the emissions of many of the specific substances that may be of concern), to the shift in the use of certain fuels (e.g., the reduction in POM is due to the decreasing use of coal as a fuel for home and commercial heating), or to the imposition of specific controls for the pollutants in question (e.g., control of the lead content of gasoline). Additional, newer evidence indicates that certain substances not heretofore considered significant air pollutants may represent an increasing threat to public health. An example of these substances is sulfates (which may account for, at least partially, the health effects associated with sulfur dioxide and/or particulates), whose concentrations have not been reduced in keeping with the reductions achieved for sulfur dioxide. Other such substances are the organic chemicals emitted by the chemical industry; these substances are increasingly suspected of being toxic and/or carcinogenic, yet emissions are increasing and the ambient concentrations (as well as the effects) are not known. Other substances have only recently been found to be of great concern in terms of environmental impacts through the air. An example of these is polychlorinated biphenyls (PCB), which may have to be controlled as an air pollutant due to the contribution of air emissions to water pollution problems.

Air pollution control is predicated upon the development of regulations covering emitting sources and the compliance with regulations by the affected sources. More than 200,000 sources are subject to the limitations prescribed in State Implementation Plans. Of these sources, some 22,000 are defined as major, i.e., capable of emitting more than 100 tons of pollutants a year. As a class, these major sources produce about 85 percent of all air pollution from stationary sources. Consequently, enforcement efforts (both State/local and Federal) have concentrated on bringing these emitters into compliance with applicable regulations. As a result, some 90 percent of these sources are either now in compliance or on firm schedules leading to compliance.

Although the Clean Air Act clearly sets forth the concept of State primacy in enforcing State Implementation Plan-based air pollution regulations, a major Federal effort has been required. Since 1972, the Federal enforcement staff has increased by 640 percent. Over 10,000 investigations a year are being conducted by Federal enforcement personnel. This situation has resulted from both the insufficiency of State/local resources for enforcement related work (it is estimated that on a nationwide basis State/local air pollution control agency staffing is only about 70 percent of what is required to implement Clean Air Act requirements) and the extremely difficult task of imposing control requirements on certain inherently dirty industries (i.e., steel, primary smelters, coal fired electric power generation) that are national in scope. Also, the responsibility for enforcing Federal New Source Performance and Hazardous Air Pollutant regulations continues to be with the Federal government. Less than 15 States have been delegated responsibility to carry out these provisions of the Clean Air Act.

Failure to achieve air quality standards in many areas despite substantial reductions in emissions due to a major Federal program to both promulgate and enforce air pollution regulations under State Implementation Plans represents the six-year reality of the implementation of the Clean Air Act. What happens next and what are the priorities of EPA are the questions addressed and put into perspective in the strategy document discussion. Essentially the strategy projects a continuation into the future of the basic programs which have served to define the implementation of the Clean Air Act over the past six years, modified where appropriate on the basis of the experience gained and new information obtained during that time:

1. The primary objective is the attainment of ambient air quality standards. On July 1, 1976 the Governors of 45 States were notified that their implementation plans were inadequate to attain standards and were requested to develop appropriate revisions. These revisions are expected to involve the application of reasonably available controls to all sources as required to attain and maintain standards. Additionally, to the extent that (even after the application of these restrictions) an area still does not meet, or will not maintain, the air quality standards, more long-range actions are required, dealing with growth, polluting facility siting, and institutional changes. Pollution emitting facilities are expected to come into compliance with new regulations as soon as practicable, but not more than three years after the effective date of the regulation except in exceptional circumstances.

2. A major Federal role in meeting ambient air quality standards will continue. Failures by the States in some cases to develop the requisite regulatory framework for air pollution control will continue to necessitate Federal action to fill the gaps in otherwise adequate State control programs. Likewise, the

extension of air pollution control to a large number of sources not presently covered, or covered inadequately, will intensify the need for enforcement action. EPA will seek to supplement State/local resources to facilitate State assumption of enforcement responsibilities, but, as necessary, it will continue to undertake Federal enforcement action under State implementation plan regulations.

3. EPA activities to identify and control pollutants other than those covered by National Ambient Air Quality Standards are likely to expand. The definition of the substances emitted by the chemicals manufacturing industry in terms of the sources, amounts, and potential health effects of the substances is underway. It is expected that a number of these substances will turn out to be of a toxic and/or carcinogenic nature, requiring control as hazardous air pollutants. As a precautionary measure, the setting of new source performance standards will be aimed at minimizing increases in the emissions of these substances.

   Additional studies of the emissions of various substances (e.g., metals and other chemicals) from various sources are likely to result in the identification of the need for the development of control requirements, such as the control of PCB's from incinerators and the control of arsenic from smelters. Other work in the occupational health and environmental health fields can be expected to reveal the need for protection of the public health from the effects of many substances not heretofore identified as air pollutants.

To a large extent the hardest phase of the efforts to meet ambient air quality standards is yet to come. The previously mentioned progress has been achieved through the application of controls to sources generally amenable to control requirements. The problems of the future may be of such a magnitude and of such inherent difficulty that ambient air quality standards may not be achieveable in some areas for many years or even decades. However, new regulatory requirements, new approaches to difficult problems, and continued attention to problems of sources compliance (including the continuing compliance of mobile sources with Federal new car emission standards) are all needed before it can be concluded that all possible efforts have been made to meet the goals of the Clean Air Act.

B. Legislative Philosophy and Objectives

1. Overview of Legislative Authorities

In order to protect health and welfare, the Clean Air Act* establishes several mechanisms to reduce and prevent air pollution while minimizing air pollution control as either an impediment to interstate commerce or a factor in interstate competition for new polluting facilities. As the basic objectives to be achieved in the abatement of existing pollution, the Clean Air Act calls for National Ambient Air Quality Standards (NAAQS). The NAAQS set forth the allowable concentrations in ambient air for a set of pollutants associated with diverse sources widely distributed throughout the nation.** To attain and maintain the NAAQS, States (or EPA, if necessary) must establish appropriate emission limits and other necessary measures for specific facilities or activities. These emission limits are set forth in a State Implementation Plan (SIP).

To prevent pollutant buildups (and to aid in maintaining as well as attaining the NAAQS), the Clean Air Act provides several mechanisms aimed particularly at new sources: New Source Performance Standards (NSPS), emission standards for new vehicles, and prevention of significant deterioration. Of course, the NAAQS-based and derived emission restrictions (i.e., those set under SIPs) apply to new sources as well.

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* References to the Clean Air Act (or simply the "Act") in this document imply reference to all its amendments, notable among them being the Energy Supply and Environmental Coordination Act (ESECA) of 1974 (PL 93-319), Clean Air Amendments of 1970 (PL 91-604), and the Air Quality Act of 1967 (PL 90-148). The 1970 amendments specified the mandatory time frames for attainment and maintenance of standards.

** Appendix A summarizes these standards.

For the control of pollutants other than those for which NAAQS are set, the Clean Air Act provides two basic alternatives. First, National Emission Standards for Hazardous Air Pollutants (NESHAP) can be set to abate less widespread new and existing sources of pollutants that are very harmful even in limited, localized concentrations. Second, New Source Performance Standards provisions of the Act also provide authority for the control of new or modified sources of localized pollutants. Except where NSPS relate to pollutants controlled by NAAQS or NESHAP, establishment of NSPS trigger requirements for States to control existing sources of specified pollutants pursuant to Federal guidelines. In addition, authorities are available for the control of fuel additives and aircraft emissions.

2. Legislative Objectives

The Act gives first priority to the protection of health, establishing mandatory times for the attainment of standards protective of health. For standards protective of welfare, the Act provides for limited administrative discretion as to the time of attainment.* The setting of environmental standards that are to be met nationally reflects the Congressional decision to provide for an adequate level of health and welfare protection

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* NAAQS set for the protection of public health are called primary standards; those set for protecting welfare are called secondary standards.

(through Federal standards) while preserving State* prerogatives in making specific control decisions (through the development and implementation of State air pollution control plans).

Several interrelated types of action make up the process by which environmental standards are to be attained. The Act mandates the adoption of legally enforceable emission reduction plans. It also provides for emission limitations to be achieved on a nationwide basis. For example, emission limits achievable by best adequately demonstrated technology (considering cost) are to be set for new or modified stationary air pollution sources and mandated emission reductions are set for new light duty motor vehicles. The Act further requires the use of certain controls not traditionally applied to air pollution control, such as the control of land use and transportation when conventional emission limits are inadequate to meet the environmental goals within the mandatory time schedules set forth in the Act, or when States choose to use such controls in lieu of more traditional control measures.

The philosophy circumscribing the State Implementation Plan process is as follows:

- The Federal Government is to set environmental standards.
- The States are required to design and implement the plan for achieving the environmental standards.

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* The Act defines as States the 50 states, the District of Columbia, Puerto Rico, Guam, American Samoa, and the Virgin Islands.

- Opportunity must be provided for public participation in the development of Federal standards, State plans, and subsequent changes in such standards or plans. Furthermore, information must be made available to the public on State progress in carrying out the plan.
- The Federal Government is to take action when States do not adopt or carry out an adequate plan for achieving the standards.

3. State Implementation Plans

The setting of National Ambient Air Quality Standards triggers the planning and control program development and implementation requirements of Section 110 of the Act. The promulgation of National Ambient Air Quality Standards on April 30, 1971, for six pollutants* set in motion the Act's planning and plan execution process for achieving those primary NAAQS by the mandatory 1975 to 1977 period.**

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* Although NAAQS have been set for six pollutants, the standard for hydrocarbons is to be used as a guide in devising implementation plans to achieve the oxidants standard. The control of hydrocarbons is treated in this document as a part of the oxidants control program.

** Since 1970, court decisions have helped define certain parts of of the Act as follows: transportation and land use controls must be included in SIPs where necessary to attain or maintain the ambient standards; the control of indirect sources of air pollution (such as shopping centers and highways) is an appropriate method of reducing the direct pollution from the automobiles which they attract; SIPs must prevent significant deterioration of air quality where the air is now cleaner than the ambient standards; and constant emission controls must be used to the maximum extent achievable in preference to pollutant dispersion techniques.

The Act places primary responsibilities for air pollution control on the States. The development of control strategies by the States for the achievement of NAAQS constitutes the essence of the planning process. The State Implementation Plans (SIPs) set forth the control strategies that will be followed and enforced by a State (within given time frames), for achievement of NAAQS within specified geographic areas, i.e., Air Quality Control Regions (AQCR). The SIPs are to specify the plan of action for achieving the Act's objectives, i.e., reduction in emissions levels requisite for meeting NAAQS and the prevention of excessive increases in emissions in the future in order that NAAQS be maintained and that significant deterioration of air quality be prevented.*

As a planning process, the SIPs are dynamic. Constant review and necessary improvements of the plans are a part of this process. The Act as well as EPA's implementing regulations include important features for reviewing, updating, and changing plans for the purpose of accommodating changing requirements (be they social or economic conditions, growth patterns, or the changing status of technology), provided these are consistent with the Act's essential requirements, i.e., the achievement of air quality levels consistent with protection of public health and welfare within specified time frames and the preservation of the nation's air resources.

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* The semi-annual reports on State progress provide summaries of the status of each State plan. The report State Air Pollution Implementation Plan Progress Report, January 1 to June 30, 1975, U.S.E.P.A. Office of Air and Waste Management, Office of Air Quality Planning and Standards, Research Triangle Park, N.C. 27711; September 1975 (EPA 450/2-75-008) contains detailed information on the status of each SIP. Subsequent reports provide additional information.

C. Overview of Status of Implementation of the Act's Requirements and Future Actions

The highest priority Federal and State action has generally been directed towards those Air Quality Control Regions where pollutant concentrations exceed national standards which are protective of health. The Agency has had the most success in carrying out those parts of the law that involve the control of specific sources of emissions by the application of a specific emission limitation. It has had less success in trying to implement pollution control measures that involve very real changes in lifestyles and land use patterns. These are changes that can take place only over periods of time; they entail very basic social, economic and environmental choices and tradeoffs which can best be made by the people involved, i.e., through the political process at the State, local and regional levels.

In some areas, the standards cannot be attained in the mandatory time period with all achievable control measures. In some Air Quality Control Regions, the level of social and economic change which may be required to meet ambient standards on time is unacceptable in the near future, in terms of economic and social impact. In other areas, there are problems associated with deficiencies in the SIPs' provisions for attainment and/or maintenance of the standards, or with the degree of source compliance with requisite emission limitations. The net effect has been that many areas have not attained the standards by the statutory deadlines.

In areas affected by control requirements having a severe economic and social impact, the Act provided only limited flexibility: Two-year extensions of time for a given Air Quality Control Region and an additional one-year extension for compliance of specific sources (or classes of sources) with plan requirements. The strict time-tables imposed by the Act and the limited discretion provided were the result of Congressional decisions that progress in controlling air pollution would only be made if stringent criteria for performance were imposed.

In areas that are not attaining standards due to SIP or SIP implementation deficiencies, actions for the near future have to concentrate on defining and implementing requisite solutions (i.e., additional enforcement activity and derivation and implementation of better control plans). Control actions aimed at the prevention of future problems (e.g., new source controls) and aimed at the development of control measures (or other solutions) for problems which have been recently documented (e.g., long-range transport of air pollutants), should also be implemented expeditiously.

One major future challenge in air pollution control is to deal effectively with the issues of growth--the issues involved in trying to preserve and maintain air quality--and to relate and reconcile different environmental concerns such as clean air with social and economic concerns such as housing, jobs, and energy. This issue involves an increasing shift in emphasis from the abatement to the prevention of pollution, including an increased emphasis on the control of those pollutants likely to lead to future air pollution problems. The air pollution issues associated with growth will require the development of planning and control processes which recognize and accommodate the extraordinary diversity of needs, conditions, and aspirations which make up this country.

D. Issues Related to the National Ambient Air Quality Standards

1. Overview

The key element in the control of air pollution under the air quality management concept embodied in the Clean Air Act is the setting of ambient air quality standards, since control requirements are derived on the basis of calculations as to the emissions reductions necessary to attain and maintain the ambient standards. Other systems for developing control plans exist and are in use in other countries. In developing the Clean Air Act, the Congress adopted this system as the one most desirable for air pollution control in this country. This basic policy decision of the Congress is not reassessed in this document. The Agency does not believe that there is reason for a change in this basic policy.

Any consideration of NAAQS must take into account the statutory basis and the policy decisions made to develop the legislative mandates. The Congress provided that public health protection should be of the highest priority and that no other considerations enter into the setting of the standards. The statute reflects this policy.* The Clean Air Act, in Section 109, states that:

> "National primary ambient air quality standards...shall be ambient air quality standards the attainment and maintenance of which in the judgement of the Administrator...allowing an adequate margin of safety, are requisite to protect the public health...

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* It should be noted that the consideration of other factors related to the control of air pollution under the NAAQS, such as costs and feasibility of control, may be taken into account as part of the state control plan development process provided that the plan is sufficient to attain and maintain the ambient standards; for this purpose, the Act specifies that the Administrator is to provide information to the States on control techniques.

> "Any national secondary ambient air quality standard...shall specify a level of air quality the attainment and maintenance of which in the judgement of the Administrator...is requisite to protect the public welfare from any known or anticipated adverse effects associated with the presence of such air pollutant in the ambient air..."*

The Act specifies that the basis for setting the NAAQS be documented in criteria documents. The issuance of a criteria document is to be accompanied by proposed NAAQS, which are to be finalized within 90 days of proposal. In the words of Section 108, the criteria are to:

> "...Accurately reflect the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare which may be expected from the presence of such pollutant in the ambient air, in varying quantities. The criteria for an air pollutant, to the extent practicable, shall include information on -
>
> > "(A) those variable factors (including atmospheric conditions) which of themselves or in combination with other factors may alter the effects on public health or welfare of such air pollutant;
> >
> > "(B) the types of air pollutants which, when present in the atmosphere, may interact with such pollutant to produce an adverse effect on public health or welfare; and
> >
> > "(C) any known or anticipated adverse effects on welfare..."

On April 30, 1971, NAAQS were set for total suspended particulates (TSP), sulfur dioxide (SO_2), carbon monoxide (CO), photochemical oxidants, hydrocarbons (HC) and nitrogen dioxide (NO_2). With the exception of the criteria for nitrogen oxides, all other criteria documents had been published prior to 1971.*

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* Welfare effects are defined by Section 302 of the Act as including but not limited to, "effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well being."

The basis for the NAAQS and the costs of attaining them have been thoroughly assessed by various review groups. In general, these groups have concluded that there is no basis for changing the NAAQS. The most extensive recent reassessment was carried out by the National Academy of Sciences (NAS) under contract with the U. S. Senate. The NAS, although dissatisfied with the available data bases for setting standards, concluded that:

> "In general the evidence that has accumulated since the promulgation of the Federal ambient air quality standards by the E.P.A. Administrator on April 30, 1971, supports those standards. Hence, on balance, the panels found no substantial basis for changing the standards."

In relation to the implementing controls on motor vehicles, the NAS stated that:

> "Weighing all of these estimates, and their uncertainties, we conclude that the benefits in monetary terms that could reasonably be expected to accrue from implementing the Federal statutory emission control standards for automobiles are commensurate with the expected cost."**

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* A portion of the criteria on SO_2 (effects on vegetation) was revised in 1973, resulting in a change in the secondary NAAQS for this pollutant.

** Air Quality and Automobile Emission Control, A Report by the Coordinating Committee on Air Quality Studies, National Academy of Sciences-National Academy of Engineering, prepared for the Committee on Public Works United States Senate, pursuant to S. Res. 135 approved August 2, 1973. Volume 1, Summary Report, September 1974. Serial No. 93-94, pages 1 and 3. U. S. Government Printing Office, Washington, D. C. 1974.

Similarly, the Agency's Science Advisory Board (SAB) found the standards to be adequate.

The NAS and SAB findings indicate that there is no reason to change the Agency's concerns with respect to pollutants covered by NAAQS. Additional data that have become available since the publication of the criteria documents confirm the need for control.

Pursuant to the advice of the National Air Quality Criteria Advisory Committee, the criteria are being updated to incorporate recent findings of research work. It is expected that the criteria will be revised in the following order: photochemical oxidants and related organic substances; nitrogen oxides; carbon monoxide; and sulfur oxides and particulates. Draft revisions are expected to be available starting in late 1977 and extending through 1980. The revisions of the criteria documents will result in an improvement of the data base available in support of the standards. If the evidence so indicates, the Agency will initiate actions for revising the NAAQS.

Although the current standards are judged to be necessary and proper, the Agency recognizes issues associated with them. A summary discussion of the issues associated with particulates, oxidants, and nitrogen dioxide is provided below. The issues related to carbon monoxide and sulfur dioxide* are limited to those related to the implementation of controls; these issues are discussed later in this document. Since evidence exists that some of the effects ascribed to TSP and/or SO_2 may be due to sulfates, a short discussion of sulfates and SO_2 is also provided.**

2. Total Suspended Particulates

The issues associated with the total suspended particulates (TSP) NAAQS are related to the health effects associated with the non-specific complex known as TSP, and the difficulty in developing control measures for certain sources of particulates that have not traditionally been associated with air pollution control programs.

The NAAQS are set for total suspended particulates which is operationally defined as the material that is captured on the filter of a high volume sampler. In general, particulates of concern are those in the respirable size range (i.e., those that can penetrate deeply into the lungs and be deposited there). The high volume measurement method, however, does not discriminate between respirable and non-respirable particles. This factor becomes a matter of concern where large quantities of particulate matter are collected by the sampling method during dust storms, leading to violations of the NAAQS. Although these natural emissions and associated air quality levels can be discounted from total ambient pollutant loadings where they can be documented, available information indicates a distinction between natural and other sources of particulates cannot be readily made.

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* In relation to sulfur dioxide, it should be noted that the recent public controversy on the use of data from the Community Health Effects Surveillance Studies (CHESS), although widely publicized, has no bearing on the validity of the NAAQS for sulfur oxides or on EPA's standard-setting process. Exhaustive investigations carried out by Congressional committees and the EPA have not substantiated the allegations made in the press in relation to the conduct of the studies or the publication of the findings. In any event, the CHESS investigations have no bearing on the current NAAQS since the CHESS were initiated after the NAAQS were set. The CHESS data, along with all other relevant data, will be used for updating the criteria documents.

** For information on the effects of air pollutants, the reader is referred to the publications listed in Appendix A.

Another dimension of particulate-related issues is that of the actual composition of the particulate. There is health effects evidence that incriminates specific substances as being responsible for observed health effects currently ascribed to total suspended particulates. Examples of such substances are sulfate, sulfite, nitrate, heavy metals, and polycylic organic matter. Controls for each of these substances cannot be set at this time, although the Agency is proceeding to develop the requisite data for setting appropriate standards (e.g., sulfates) or has already initiated control action for a specific substance (i.e., lead).

Certain sources of particulates present a third category of issues. Difficult to control sources can contribute significantly to TSP levels. Examples of these types of sources are the "urban particulate background," the natural sources mentioned earlier, fugitive emissions, and the formation of particulates in the atmosphere as a result of photochemical or other reactions involving gaseous substance emissions. These problems are addressed to a very limited extent by existing SIP control strategies.

The control of "urban particulate background," such as particulates emitted by automobiles and resuspended dust from roads, is of a long-term nature, to be addressed in the future. Longer-term or more difficult solutions, such as the reduction of secondary particulates formation, must await the implementation of controls for specific pollutants (e.g., oxidants, sulfates) or the development of long-term air quality maintenance plans which can take into account these problems. Fugitive emissions from stationary sources generally escape to the atmosphere in ways other than through a primary exhaust system or are more directly emitted to the atmosphere from industrial processes that operate out-of-doors, such as coke ovens and rock-crushing operations at quarries. Fugitive emissions also result from poor maintenance of process equipment and from careless process operations. Once captured, fugitive emissions can be ducted to available emission control systems, such as baghouses for particulates and scrubbers for gaseous pollutants, where they can be effectively collected. A regulatory approach which requires the elimination of or the capture and cleaning of fugitive emissions is the recommended control strategy for control of fugitive particulate emissions at the present time.

Fugitive dust emissions from natural or non-point sources* are found in the more arid areas of the nation, such as the Southwest, and also where farming operations and unpaved roads are prevalent. Windblown dust (both natural dust and soil exposed by man, e.g., farms, roads) and dust generated directly by man's activity (e.g., driving on unpaved roads), creates high ambient concentrations of particulate matter. The control strategies determined necessary to attain national standards in AQCR's impacted by fugitive dust generally indicate that unconventional air pollution control techniques may be required, such as:

- Chemical stabilization of soils;
- Implementation of soil management control programs;
- Paving of more heavily traveled unpaved roads in generally urbanized portions of AQCRs;
- Speed control on all unpaved roads; and
- Stabiliaation or watering of construction sites, material storage piles, tailing piles, and animal feedlots.

These fugitive dust control strategies have not been fully implemented because they include some controls that are considered to be socially disruptive and unreasonable. Some of the areas which would have to implement these control measures for fugitive dust control also tend to be impacted by high particulate levels resulting from natural wind-blown dust from storms.

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* The term "fugitive dust" should be distinguished from the term "fugitive emissions." "Fugitive emissions" generally refer to industrial process emissions which do not pass through a stack or chimney.

3. Sulfur Dioxide and Sulfates

The issue associated with sulfates is whether or not the health effects currently ascribed to sulfur dioxide are actually related to sulfates in general, or perhaps, to specific sulfur-containing compounds, such as sulfuric acid, zinc ammonium sulfate, ferric sulfate, and cupric sulfate. The significance of this is that sulfates tend to be more persistent in the atmosphere than SO_2 itself, and much of a 24-state area in the Northeast has sulfate levels approaching or exceeding the ambient concentrations which may be associated with health effects even where SO_2 levels are meeting the SO_2 NAAQS. In addition, there may be synergistic health effects associated with the action of sulfates and other pollutants. The sulfate issue is further compounded by the long-term environmental effects that are suspected but not yet proven, such as acidification of rain. The information currently available is sufficient to cause concern, but not sufficient to warrant specific regulatory action.

EPA's policy on sulfates (outlined in the September 1975 Position Paper on the Regulation of Atmospheric Sulfates*) recommends limiting increases in SO_x emissions. Health effects studies are continuing, but the complexity of the problem is such that standards specific to sulfates will probably not be set prior to 1982. EPA's policy recommends limiting any SO_x emission increases in a broad 24-state area of the heavily industrialized eastern and northern states until better data are collected on the adverse health effects of sulfates.

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* U. S. Environmental Protection Agency, Office of Air and Waste Management, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711; EPA - 450/2-75-007 September 1975.

4. Photochemical Oxidants

Issues associated with the NAAQS for photochemical oxidants are related to regional transport, natural ozone levels, the components of photochemical oxidants other than ozone, and the relationship between hydrocarbon emissions and photochemical oxidants in the ambient air.

A significant new dimension is added to the oxidant air pollution problem by two recently acknowledged factors: It appears that all non-methane hydrocarbons and other reactive organic substances eventually participate in photochemical reactions, and oxidant precursors are transported large distances in stagnant air parcels associated with high pressure systems. Although oxidant (and precursor) transport has been identified as one of the causes of ambient air quality levels in excess of NAAQS in some areas, it should be noted that the primary cause of violations of the NAAQS is the emission of oxidant precursors in the area where high readings are found. The oxidant levels measured in or immediately downwind of a major urban area are principally due to emissions in that urban area, not to rural emissions or emissions from other urban areas upwind. Control within broad urban areas will continue to be most effective in reducing peak oxidant levels.

The mechanism postulated for oxidant transport is as follows: As high pressure systems travel through the U. S. in the summer, they provide ideal conditions for oxidant formation--large amounts of HC and NO_x are injected into the air mass by the multiplicity of sources in these areas (both urban and rural), extended time periods are provided for all HC to participate in photochemical reactions, the high temperatures and insolation associated with these systems enhances photochemical reactions, and little opportunity exists for dissipation of oxidants formed. In brief, these atmospheric systems enhance photochemical reactions and impede natural cleansing of the atmosphere. In addition, evidence indicates that all non-methane hydrocarbons and other reactive organic substances eventually react photochemically if given sufficient time to react. (Studies in the past had concentrated on limited timeframes and limited geographical areas.) This means that all non-methane hydrocarbon and other reactive organic substance emissions are of significance for the control of photochemical oxidants, and that emissions in one city or area can result in high oxidant levels in other areas or cities.

EPA is currently attempting to better define the nature and magnitude of precursor transport, but the implications for control programs are clear: control programs will have to consider and encompass wide geographic areas, and all sources of photochemical oxidant precursor emissions may have to be abated. Although the adequacy of our understanding of emission reductions required to attain NAAQS for oxidants is not as good as would be desirable (current techniques being less than ideal for deriving control requirements*), it is clear that reductions of HC emissions lead to improvement in oxidant air pollution. Trends in the Los Angeles area (which has available the largest data base on oxidants) and laboratory data support this conclusion. Therefore, EPA's strategy for oxidant control is to reduce hydrocarbon emissions whenever it is feasible. Oxidant control plans are to focus on the areas responsible for the greatest proportion of hydrocarbon emissions, i.e., urban areas. (States can, if they so choose, extend controls for hydrocarbons to areas outside the urban concentrations which are the focus of EPA's strategy.)

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* The factors which determine the concentrations of oxidants formed in the atmosphere include: the amount and kinds of organic compounds initially present and the rate at which additional organics are emitted into the atmosphere, the amount of nitrogen oxides initially present and their emission rates, and sunlight ultra-violet intensity, temperature, and other meteorological factors. The interactions of these factors and the chemical reactions involved are very complex and have been the subject of continuing scientific investigation during the last 20 years, including atmospheric studies, laboratory smog chamber studies, and computer simulation of the oxidant forming process. Nitric oxide (NO) is the major form of nitrogen oxide emitted in combustion processes. Nitrogen dioxide (NO_2) is formed from NO and is the compound which decomposes in sunlight to initiate the formation of ozone. Because the relationship between hydrocarbon emissions and oxidant concentrations is dependent on so many factors, various attempts have been made to develop a simplified relationship. These bases for control strategy derivation are not discussed in this document.

It should be noted that in many cases SIPs do not provide for oxidant precursor control for areas violating NAAQS since data on ambient air concentrations of oxidants were not available at the time of plan preparation. Furthermore, current SIP control strategies for the attainment of the oxidant NAAQS were developed on the assumption that local high readings of oxidants were the result of precursors emitted in the area surrounding the monitor reporting the high readings. The new data on air quality and photochemical oxidant formation indicate that very complex and far-reaching control programs will have to be developed if the standards are to be attained in the future. The clear implication is that controls probably will be required on a much broader geographic scale than has been the case to date.

In urban areas, the ratio of hydrocarbons to nitrogen oxides tends to be low so that changes in levels of photochemical oxidants locally generated are quite sensitive to changes in the levels of hydrocarbon present. Thus, hydrocarbon emission control programs would be expected to be effective in reducing the amount of photochemical oxidants locally generated in the urban area, thus also reducing the amount transported to neighboring rural areas.

An investigation is underway to determine the extent of the geographical area around urbanized locations where hydrocarbon emission control programs will be most effective in reducing photochemical oxidant levels. Early findings of this investigation indicate that these areas may be proportional to city size and may extend up to 85 miles from major metropolitan areas. In addition, upwind-downwind measurements around smaller urban areas and isolated point sources of hydrocarbons and nitrogen oxides indicate that there is little if any increase in observed photochemical oxidant concentrations as a result of the emissions from such smaller urban areas and isolated point sources. Although very limited data are available, it appears that urban areas with a population less than 200,000 produce little, if any, measurable increase in photochemical oxidant levels.

In view of the widespread nature of oxidant problems, emphasis for setting new source performance standards for stationary sources is being shifted to sources of oxidant precursors. Mobile sources controls also concentrate on this objective--all significant mobile sources of HC and NO_x emissions are in the process of being covered by stringent standards applicable to new sources. However, new source controls will not lead to attainment of the standards in many areas of the nation, nor is there assurance that purely technological solutions will lead to requisite emission reductions to attain and maintain the NAAQS. A rethinking of many of the ways in which transportation sources are used is required, as well as long-term consideration of the air pollution impact of the sources of hydrocarbons.

An additional issue encountered with the NAAQS for photochemical oxidants is the low value of the standard (0.08 parts per million, one hour average) when compared to reported natural background values, which range in the order of 0.04 to 0.06 ppm. It has been argued that many areas with reported violations of the NAAQS are violating NAAQS due to natural causes (due to ozone formed from natural HC sources, such as forests, or due to ozone advected from the stratosphere), and, therefore, that no control actions are possible. Whatever merit these arguments may have, levels in excess of the NAAQS are generally related to human sources of photochemical oxidant precursors, so the need for HC controls will not be diminished.

Another issue is related to the measurement of oxidants. The NAAQS for photochemical oxidants were established on the basis of evidence related to the health effects of oxidants; the currently accepted Federal Reference Method (FRM) for ambient air quality monitoring of oxidants is specific for ozone, one of the components of photochemical oxidants. (The oxidant found in largest amounts is ozone; oxidants also include the group of compounds referred to as PAN, or peroxyacetyl nitrates, and other compounds produced in much smaller quantities.) It has been argued that ozone, by itself, is a poor proxy for the complex known as photochemical oxidants, and that control plans derived on the basis of measurements made with the FRM are not necessarily justified. However, it should be noted that ozone measurements are closely related to measurements for total net oxidants.*

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* Air Quality Criteria for Photochemical Oxidants, U. S. DHEW, NAPCA, March 1970, Publication AP-63.

5. Nitrogen Dioxide

The review of the NAAQS indicated that a possible deficiency of the NO_2 NAAQS was the lack of a short-term standard for protection against the effects of peak levels of this pollutant. Current evidence suggests that the ambient air quality standard should include a limitation on peak levels of exposure; the data suggest that the limitation should be on repeated peak levels rather than a limitation on one peak per year, but the health effects data base is not yet sufficient to warrant control action on this basis. The short-term standard is expected to be in addition to the current annual average standard, which will continue to be used to assess plan adequacy and to implement controls for NO_2.

E. Monitoring Air Pollution

Proper judgments about the attainment and maintenance of the NAAQS can only be made with data obtained from an adequate monitoring program. It is essential that strategies for the control of pollutants also include monitoring of these pollutants. Monitoring covers those activities which are related to establishing the concentration or quantity of a pollutant. These activities include ambient air monitoring, source emission monitoring, and dispersion modelling.

In recognition of the critical role that monitoring plays in air quality management decisions at all organizational levels, EPA has established the Standing Air Monitoring Work Group. The Work Group has reviewed air monitoring activities performed in support of SIP's and has developed an overall monitoring strategy which, when fully implemented, should correct identified problems and improve current monitoring operations. (The final strategy document is to be available by summer 1977.) The implementation of this strategy is intended to be phased over a five year period since it is recognized that rapid changes to on-going monitoring programs entail the risk of decreasing the effectiveness of control program activities dependent on monitoring data.

The monitoring strategy emphasizes the need for quality assurance. Since the quality of the monitoring data has profound impact and implications on the soundness of pollution control decisions, the implementation of a minimum quality assurance program for both source and ambient air monitoring activities is to be given greater emphasis. The goal is to assure that all agencies involved in air monitoring use the best available instrumentation and quality assurance techniques within their limited resources.

Key changes in air monitoring are directed towards increasing EPA's and State/local agencies' ability to make decisions concerning attainment and maintenance of the NAAQS through a refined ambient air monitoring program. These changes are to be made after a comprehensive review of existing state air monitoring networks.

The strategy recommends that as a result of this review, a small core of fixed National Air Quality Trend Stations operated by State and local agencies be established. Data from these stations will in most cases be adequate to meet EPA HQ minimum needs for determining trends and evaluating and developing national control policies.

Since the national trend stations will meet only a part of the State and local agency needs for air monitoring data, additional sites will be operated by these agencies as required. These monitoring sites will be used to supplement the national trend site data and provide for more complete geographic coverage, especially in non-attainment areas. The sites comprising this network would be reviewed annually as to the need for relocation. All monitoring performed apart from these fixed networks would be flexible and thus easily adaptable to changing priorities and needs of the State and local agencies. This type of monitoring should enhance the usefulness of the fixed station data by increasing the coverage of that network for short time periods and by producing data where none existed previously or where data are no longer valid.

In the future, State and local agencies will need to rely more heavily upon dispersion models to augment their capabilities to predict the impact on air quality of individual sources or source categories. This is especially important to support activities involving new source reviews. Multi-source urban dispersion modelling can also be used to evaluate effectiveness of proposed

SIP revisions and, in conjunction with population distribution information, is an extremely valuable tool in estimating the exposure of the population to levels above the NAAQS. This latter effort is valuable in displaying information to the public in a readily understandable manner as well as providing a good measure of the success of control programs.

A. Overview of Progress to Date

The air has become measurably cleaner since 1970.* Reductions in emissions have resulted in improvements of ambient air quality in terms of the actual levels of air pollutants in the air and in terms of the number of times that the NAAQS are exceeded. Both of these measures indicate that population exposures to unhealthy levels of air pollution are decreasing. Although standards are not universally met at this time, important reductions in population exposure have been achieved. Continued progress in reducing population exposures is expected in the future and is the focus of control programs.

The concentration of particulates in the ambient air has decreased annually at an average rate of 5 percent through 1975. A review of the most recent sulfur dioxide ambient data shows that concentrations in urban areas have decreased an average of 30 percent since 1970. Fewer than 10 percent of all urban monitors are exceeding the sulfur dioxide standards.

For carbon monoxide, associated mainly with motor vehicles, historical data are limited. Available data in the several States and major cities suggest a continuation in the general improvement noted previously in EPA trend reports. The average number of occasions in which 8-hour concentrations exceed the carbon monoxide standard has declined, typically by 50 percent in many of the urbanized portions of these States.

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* Additional material on environmental status is available in National Air Quality and Emissions Trends Report, 1975, U. S. E.P.A., Office of Air and Waste Management, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina 27711; November 1976 (EPA-450/1-76-002). This report is issued annually.

Historical data on oxidants, which are produced largely by hydrocarbon and nitrogen oxides emissions from both stationary and mobile sources, are non-existent in all but a few urban areas. Los Angeles and San Francisco have shown notable improvements where the number of hours in excess of the oxidant standard has been reduced by as much as 50 percent since 1970 at many of the monitoring stations. (It should be noted that California has imposed stringent HC emission control programs.)

Nitrogen dioxide emissions have increased nationally about 10 percent since 1970. Because of recent changes in measurement methodology for monitoring nitrogen dioxide, few areas have sufficient historical data to assess trends. Valid data indicate that only a few areas of the country have ambient nitrogen dioxide concentrations in excess of the national standard.

Although significant progress has occurred, many problems remain. The solutions to these problems affect fundamental activities of the nation such as power generation, industrial production, transportation, and agriculture. Some pollutant levels can be reduced through better compliance with existing regulations. Others require new and innovative revisions to existing control strategies.

Particulates and sulfur dioxide are predominantly associated with stationary sources of pollution. Approximately 22,000 major industrial emitters (those capable of emitting over 100 tons of pollutants each year) account for about 85 percent of the stationary source air pollution. By July 1977, EPA expects over 90 percent of these major emitters to be in compliance with existing State Regulations. For particulate matter, numerous small sources in urban centers require control. Some areas will require control strategies beyond the classic stack controls, including controls of fugitive emissions, other particulates, and fugitive (windblown) dust. For sulfur dioxide, non-attainment results primarily from delayed implementation of existing regulations for emissions from power plants and non-ferrous smelters.

For photochemical oxidants, strategies are based on controls of hydrocarbon emissions from both stationary and mobile sources. Oxidant and carbon monoxide concentrations are expected to improve somewhat in most areas of the country as controlled automobiles replace older, uncontrolled vehicles. Even with substantial improvement in air quality for oxidants and carbon monoxide, however, a large number of AQCRs are expected to experience violations of the ambient standards during the next 10 years. Additional urban areas will require transportation control measures in order to attain standards even by the mid-1980's.

For nitrogen dioxide, the typical problem, where it does exist, is in an urban area where observed nitrogen dioxide concentrations are either slightly above or below the standard. Such conditions generally represent a problem for maintenance rather than for attainment of the standard.

B. SIP Revisions

Actions taken by EPA and the States with respect to non-attainment areas involve a mix of actions aimed at continued implementation of emission reduction provisions of the SIPs, at identifying areas which require revisions of the SIP, and at revising the SIPs where current SIPs are found to be substantially inadequate to attain the NAAQS. The process involves identifying non-attainment AQCRs, identifying the factors that result in non-attainment, developing plans for corrective action, and implementing the corrective actions.

Initial calls for SIP revisions were issued by July 1, 1976, for SIPs which were determined to be substantially inadequate to attain the NAAQS. Calls for SIP revisions were issued as follows:

	Pollutants for Which a Plan Revision Is Required				
	TSP	SO_2	CO	O_x	NO_2
Number of States issued a call for revision*	31	12	22	29	3

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* Appendix E identifies the specific States.

The indication that a State needs a SIP revision does not necessarily indicate that conditions exceeding the national ambient standards prevail throughout the State. The calls for revision indicate that a State has to reassess its air pollution problem and develop, if warranted, additional control measures for attaining standards. In addition, special planning procedures must be followed for 119 areas identified as air quality maintenance problem areas.

The State implementation plan revisions now being required are subject to two submission dates. First, if needed, all achievable emission limitations must be submitted as SIP revisions no later than July 1, 1977. The term "achievable" is intended to require reasonable "technology forcing" regulations if necessary, rather than regulations based simply on "off-the-shelf" technology. Second, all other measures needed to attain and maintain the NAAQS must be submitted no later than July 1, 1978. These "other measures" should be comprehensive and innovative where needed, and may include items such as land use measures, transportation controls, transit improvements, zoning ordinances, building codes (such as to increase insulation, thereby decreasing energy use), and inspection/maintenance programs (for stationary and/or mobile sources). This schedule for plan revision is undergoing revision as EPA and the States determine the actual controls required. Some delays beyond these dates are to be expected in the process for plan revision, especially in relation to oxidants.

By 1978, it is expected that all achievable control measures would have been identified if required for the attainment of the NAAQS, that a plan for the implementation of these measures will have been submitted by the states and approved by EPA, and that the process for identification and adoption of the measures requisite for the maintenance of the standards will have been implemented. Beyond 1978, actions would be related to the implementation of the control plans. It is expected that a relatively greater emphasis will be placed in this time period on new sources, both for purposes of prevention of air pollution (including prevention of significant deterioration) as well as the maintenance of NAAQS.

C. Emission Reductions from Sources--Issues and Policy

1. Introduction

The preceding discussion of issues associated with the NAAQS highlighted the factors that affect the current status of the national air pollution control program and that have dictated the Agency's strategy in implementing the Clean Air Act. The currently documented widespread need for revisions of the SIPs reflects the improved understanding, developed over the last few years, as to the factors that affect air quality and the actions that still must be taken if the environmental protection goals are to be achieved. Another factor that has contributed to the lack of attainment of the standards has been the lack of action on the part of pollutant sources in reducing emissions. The significant issues that have impeded full implementation of these controls are examined below.

2. Total Suspended Particulates and Sulfur Dioxide

The stationary sources of particulates and sulfur oxides (e.g., factories, power plants, home heating) have traditionally been the focus of air pollution abatement efforts since these sources have been recognized as responsible for the bulk of the particulate and sulfur dioxide air pollution. Based on an overall assessment of the status of compliance of sources and the need for corrective actions, EPA generally has placed highest priority on the implementation of control requirements for sources of sulfur oxides and particulates. This emphasis has resulted in the improvements in air quality indicated in the preceding section.

With a few minor exceptions (e.g., particulates emission limitations for the State of Illinois) all states now have enforceable emission limitations for stationary installations.* Except for portions of 16 States (where extensions of up to 2 years were granted for one or more pollutants), the primary National Ambient Air Quality Standards were to be achieved by May 31, 1975, i.e., substantially all sources should have been in compliance with the SIP emission limitations by this date. EPA, State, and local enforcement programs have focused first on ensuring compliance by major emitters in order to produce the greatest reduction in pollution levels with available resources. Despite progress in SIP enforcement, a number of facilities within major source categories have not achieved compliance with emission standards within the time limits prescribed by the Act. Notable among these source categories are coal-fired power plants, iron and steel manufacturing plants, and smelters; these sources are discussed below.

In addition to the problems caused by continuing violations by classes of heavy industrial emitters, it is becoming increasingly apparent that in many areas of the country poor air quality is the result of large numbers of violations by smaller emitters (i.e., less than 100 tons per year). EPA and States are conducting analyses of non-attainment AQCRs to identify those where minor sources are responsible for delays in the attainment of health-related air quality standards so that enforcement efforts and adoption of adequate regulations can be initiated where needed.

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* On the order of 200,000 stationary sources are subject to SIP emission limitations. Of this number, approximately 22,000 are major emitters.

Furthermore, it is clear that, in many cases, traditional control of stationary sources (e.g., limitations placed on emissions from a smokestack) will not suffice to attain and maintain the NAAQS. Ambient air loadings of particulates often are significantly influenced by other than stack emissions: the formation of particulates in the atmosphere from gaseous emission; the contributions from motor vehicle exhausts; the re-entrainment of dust from streets; and dust-producing activities such as construction, unpaved roads, and farming operations. These issues are discussed earlier, under the TSP NAAQS section.

In relation to sulfur dioxide, shortages of low-sulfur-content fuels and the national policy of reducing reliance on insecure foreign sources of petroleum will result in the utilization of higher sulfur content fuels (e.g., coal rather than fuel oil, fuel oil rather than natural gas) in the future. EPA views these developments with concern since they have potential for aggravating sulfur dioxide air pollution problems as well as increasing the resulting atmospheric loading of sulfates.

a. Primary Non-Ferrous Metals Smelters

The nation's 25 non-ferrous smelters account for about 10 percent of the total sulfur oxides emitted by stationary sources. Regulations for control of smelters located in several States* were proposed by EPA in 1972. Numerous court suits were filed by the individual non-ferrous metal smelters against both the proposed regulations as well as subsequent final rulemaking. The issue involved is the degree to which utilization of Supplementary Control Systems (SCS) and increased stack height is to be permitted and the amount of emission reductions that should be required through the application of constant emission reduction systems.

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* These states are Arizona, New Mexico, Nevada, Utah, Idaho and Montana.

The regulations applicable to smelters require application of best available control technology (BACT) as a long-term goal, but during the interim permit the use of reasonable available retrofit control technology (RACT) and, if necessary, also allow the interim use of SCS and tall stacks until BACT-calibre techniques that are less costly than those that exist today become available. Each smelter using SCS is further required to accept liability for NAAQS violations in its area of liability and to conduct a research and development program to hasten the development of less-costly, BACT-calibre emission reduction technology.

For some smelters, the alternative to the use of SCS and RACT would be economically unrealistic. This industry is mostly composed of older plants and is in competition with foreign smelters. EPA has taken into account the specific problems affecting this industry. Thus, special dispensation has been granted and EPA, for the interim, is not requiring that NAAQS be met solely through emission reduction techniques. It should be noted that, in general, EPA is not requiring any changes in process equipment,as would be required in many instances if BACT-calibre equipment were the present-day standard. EPA is requiring only that

RACT emission control facilities be installed and maintained and, for the interim, is also allowing SCS to be used for gas streams that would otherwise require BACT-calibre control equipment. In all events the control strategy permitted must demonstrate attainment and maintenance of national ambient standards.

b. Iron and Steel Mills/Coke Plants

The iron and steel industry presents one of the most difficult compliance problems for state and Federal air pollution enforcement programs. There are about 246 steel and coke-making installations in the United States, of which 218 produce iron and steel (and may or may not produce coke). The remainder solely produce coke to be used in metallurgical and other industries. Nearly all of these installations are located in areas where the primary NAAQS have not been attained. At least one SIP emission limitation is being violated at almost every installation.

The steel industry is characterized by less than half the degree of compliance of all major sources. Although the iron and steel industry industry faces difficult problems in meeting emission limitations and, in general, in complying with air pollution control requirements, this industry generally has failed to make reasonable progress in controlling air pollution. The Agency judges the lack of progress to have been caused, in many cases, by industry failure to do what is achievable rather than the magnitude of the task facing the industry. However, there are substancial differences in control levels from company to company, and significant recent progress has been made at a number of iron and steel mills. The Agency will continue to concentrate its enforcement efforts to assure that iron and steel mills come into compliance with SIP requirements.

c. Coal-Fired Power Plants

Coal-fired power plants account for approximately 55 percent of sulfur air loadings. By mid-1973, it became evident to EPA that many coal-fired power plants were not making plans to comply with sulfur oxide emission limitations because supplies of low-sulfur coal (the favored approach to compliance with emission standards) were becoming scarce, and the principal alternative means to compliance, the stack gas scrubber, was viewed by the industry as unreliable. National public hearings were held in the fall of 1973 to determine the validity of the utilities' contentions regarding optional means of compliance. The 1973 hearing panel concluded that the basic technology problems associated with flue gas desulfurization (FGD) had been solved or were within the scope of current engineering and, further, that FGD could be applied at reasonable cost. A special EPA enforcement program was then initiated for power plants on the basis of these findings.

EPA recognized, when it approved the State Implementation Plans, that there would be shortages of acceptable coal if all the States enforced their control regulations. To alleviate this potential shortage, EPA developed a policy (the "Clean Fuels Policy") of encouraging State review of plans in order that sulfur emission limits be modified whenever this could be done without exceeding the primary air quality standards. A similar policy was adopted by the Congress in the Energy Supply and Environmental Coordination Act of 1974 (ESECA). The policy encouraged the States to analyze their control requirements in a more detailed fashion than was generally done at the time of initial SIP development. These actions are specific to each State, as the degree of control required to achieve the primary standard varies widely between air quality control regions and individual sources in each region. Reviews of SIPs (required by ESECA) have been carried out. The results have been submitted to the States for their consideration and action.

d. Tall Stacks and Supplemental Control Systems

EPA's policy on the use of pollution dispersion techniques, such as tall stacks and supplemental control systems (SCS)*, was published in the Federal Register of February 18, 1976 (41FR7450). The policy is also contained in a guideline to EPA regional offices on the acceptability of tall stacks and SCS as part of the SIP control strategy for SO_2 control.* This policy is effective as of January 13, 1976.

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* The term "supplemental control system" means any system which limits the amount of pollutant emission during periods when meteorological conditions conducive to ground-level concentrations in excess of national standards exist or are anticipated. SCS will be generally effective only for isolated sources.

The policy (derived pursuant to opinions rendered by three United States Circuit Courts of Appeal), in essence, is that stack height increases and/or SCS are acceptable control strategy measures only after the application of other available control measures and are never permitted as a means of allowing the increase of emissions at any source. Constant emission limitation is the preferred strategy for attaining and maintaining the national standards. For smelters and certain older power plants, SCS is acceptable only as a temporary measure in conjunction with the use of reasonably available control technology (acid plants for smelters and coal washing for power plants) and only in circumstances wherein the SCS can reliably attain and maintain the national standards. SCS is not allowed for new sources.

The EPA guidance is used by the regional offices in reviewing plan revisions and in re-evaluating existing State Implementation Plans to determine whether any such plans have the potential for, or explicitly permit, the use of dispersion dependent technology as a means of achieving ambient air quality standards. The principles set forth in the document will also be used in reviewing State new source construction permits.

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* There is no guidance provided in regulatory format. Regulatory action on tall stacks and SCS is part of the specific SIP approval/disapproval and promulgation actions. The EPA guideline document is Legal Interpretation and Guideline to Implementation of Recent Court Decisions on the Subject of Stack Height Increase as a Means of Meeting Federal Ambient Air Quality Standards, OAQPS No. 3.0-003.

There are generally three situations--limited to SO_2 emissions--which permit the application of SCS:

(1) Under prohibition orders issued by FEA under the Energy Supply and Environmental Coordination Act. Power plants required to convert to coal must install control equipment and/or use fuel which would comply with the SIP as expeditiously as possible. In the interim, ESECA requires that the primary standards be met; an enforceable and reliable SCS can be used to achieve this purpose when primary standards are attained and coal which conforms with SIP requirements is unavailable.

(2) Under Enforcement Orders. When EPA issues an enforcement order to a source to come into compliance with the SIP, it may be necessary to require the source to apply an SCS for an interim period in order to protect the ambient standards.

(3) As Part of an SIP Revision. Under this mechanism, a source cannot operate an approved SCS unless a number of conditions are met, including installation of Reasonably Available Control Technology (RACT).

e. EPA's Policy on SIP Revisions Aimed at Permitting Use of Higher Sulfur Fuels

The energy situation, the economy, and to some extent the low SO_2 levels being reported in most areas are causing a number of States to consider revisions to SIPs which will permit higher sulfur fuel to be used in selected AQCRs. However, changes in fuel use will tend to increase emissions of sulfur, resulting in increased sulfate concentrations. Given the lack of a defined control requirement for sulfates, the Agency cannot deny State requests for changing regulations applicable to fuel sulfur content if the State demonstrates that the SO_2 standard will be attained and maintained. On the other hand, evidence available to date indicates that the effect of sulfates may be as important, if not more so, than the effects of currently controlled pollutants. Therefore, the Agency views with concern the trend to increase the emissions of sulfur to the atmosphere by the use of higher sulfur content fuels.

EPA's policies and programs involving sulfates, significant deterioration, tall stacks, SCS and New Source Performance Standards are aimed principally at minimizing SO_2 increases. The sulfate policy recommends limiting any SO_2 emission increases in a broad 24-state area of the heavily industrialized eastern and northern States until better data are collected on the adverse health effects of sulfates.

The prevention of significant deterioration regulations legally limit SO_2 air quality increases by establishing constraints below the NAAQS for SO_2.* The tall stack and SCS policies, recently confirmed by Federal court decision, require the application of all available permanent control measures before dispersion techniques can be used to attain standards.

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* It should be noted that a change to the use of fuels which lead to increased emissions is not covered by the PSD regulations.

On the other hand, the Clean Fuels Policy, which was initiated early in 1972 for coal-burning sources, was an attempt by EPA to permit continued burning of relatively high-sulfur coal, where this would not lead to violations of the ambient standards, in order to release presently limited supplies of lower sulfur coal for use in other, more critical, areas. If a State emission reduction schedule prevented continued burning of high sulfur coal that was adequate to meet the NAAQS, the Clean Fuels Policy encouraged the State to revise its SIP to make it legal. Congress reinforced and extended the philosophy of the Clean Fuels Policy by its passage of ESECA in 1974. The intent of Section 4 of ESECA was to encourage States to relax SO_2 emission limits where possible without causing violations of the ambient SO_2 standards, even if this means an actual increase in SO_2 emissions. The Clean Fuels Policy and the ESECA legislation reflect a policy of cooperating with States which want to relax emission constraints, provided that the SO_2 standard is attained and maintained.

Given the potential conflicts among the foregoing policies, the general policy on SIP revisions which relax SO_2 emission limitations is: First, the basis for approval must be whether the national primary standards will be attained and maintained in accordance with the Clean Air Act. The secondary standard must be attained within a reasonable time. Second, EPA must cooperate with national energy programs to the fullest extent possible consistent with the timely attainment and maintenance of standards. Finally, in view of the concern over other pollutants and effects related to SO_2 emissions (e.g., sulfates, secondarily formed particulate, and acid rain), rigorous demonstrations that proposed SIP revisions will attain and maintain standards will be demanded.

It is expected that the end result of these policies and activities will be: to attain the current primary sulfur dioxide standards everywhere as rapidly as possible; ensuring that the health effects from sulfate particulates are minimized; electrical power generation capability will not be disrupted; and domestic energy resources will be used. This approach will also allow electric utilities to continue to use available high sulfur coal production to meet the nation's energy demands where such fuel will not cause violations of NAAQS.

3. Photochemical Oxidants, Carbon Monoxide, and Nitrogen Dioxide*

a. Introduction

Motor vehicles are responsible for virtually all man-made emissions of CO in all areas of the nation; they account for a variable (yet substantial) proportion of hydrocarbon and NO_x emissions (between 27 percent and 87 percent for hydrocarbons and 25 percent to 65 percent for NO_x). The control of CO, oxidants, and NO_x is significantly related to the control of motor vehicle emissions. However, the variations in the contributions of sources for different areas of the nation have resulted in the development of specific control measures unique to each area.* Control strategies are primarily concentrated on reducing emissions of photochemical oxidants precursors (i.e., organics**) and carbon monoxide. Somewhat lower emphasis has been placed to date on the control of NO_x (also an oxidant precursor***) emissions due to the lesser magnitude of the NO_2 air pollution problem, the reliance on organics control for achieving oxidant reductions, and limited available control techniques.

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* For convenience, the pollutants will be referred to as CO (for carbon monoxide) and NO_2 (for nitrogen dioxide). These pollutants are also referred to as automotive-related pollutants due to the predominance of motor vehicles as the principal emissions source.

EPA policy for control actions limits implementation to those controls which are not economically or socially disruptive. Highest priority for control has been given to attaining emission reductions from stationary sources of HC through the application of Reasonably Available Control Technology and the implementation of State motor vehicle emissions inspection and maintenance programs for those areas for which SIPs already provide for such measures. Adoption of control measures for areas requiring SIP revisions will follow guidelines as to reasonableness of control measures.*

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* In relation to automotive-related pollutants, it should be kept in mind that SIPs are less well advanced in terms of development and implementation of adequate planning processes and controls than are the SIPs for TSP and SO_2.

** The principal sources of organic compounds are the hydrocarbon emissions from automobile and truck exhausts, gasoline vapors, paint solvent evaporation, open burning, dry cleaning fluids, and industrial operations. There are also natural sources such as seepage from the ground and emissions from vegetation.

*** Nitrogen oxides are emitted primarily from combustion sources such as electric power generation units, gas and oil-fired space heaters, and automobiles, diesel and jet engines.

b. Motor Vehicle Emissions Control**

Given the nature of the automobile industry and the universal use of automobiles, the most effective point for controlling motor vehicle emissions is by providing for the incorporation of controls into new vehicles prior to sale to the ultimate user. The Clean Air Act provides for a comprehensive control strategy aimed at the control of new vehicles.

The Federal Motor Vehicle Control Program (FMVCP) provides for a cumulative improvement in ambient air quality (all other factors being equal) as vehicles covered by increasingly stringent standards are introduced and replace higher emitting cars. Full turnover of the vehicle population requires about ten years. Therefore, although significant emission reductions from motor vehicles may have already been achieved, the statutorily mandated new motor vehicle emission reductions in CO and HC emissions impact only minimally on the ability to meet ambient air quality objectives prior to the 1985-90 period in the areas not currently attaining standards.

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* A summary of these guidelines is provided in Appendix C.

** For background material on the motor vehicle emissions control programs of the Agency, the reader is referred to the report Progress in the Implementation of Motor Vehicle Emission Standards June 1975 (U.S. EPA, Publication EPA 230/1-76-001; U. S. Government Printing Office, 1976) which provides a good summary description of the activities carried out for the control of motor vehicles and presents the status of programs implemented to that date.

Growth of both the vehicle population and vehicle use, deterioration of emission control systems on vehicles in use, the slow turnover of the vehicle population, and changes in the date by which automobiles are to meet statutory emission standards greatly reduce the impact of the motor vehicle standards. However, it is also clear that the FMVCP will have a significant impact on the achievement and maintenance of the NAAQS in most areas of the country. In addition, in keeping with the strategy of placing controls on new vehicles, more stringent controls for heavy duty and medium duty vehicles, and controls for motorcyles are being developed; these controls will further reduce the future air pollution impact of these sources.

Available data indicate that many in-use motor vehicles do not meet emission standards. It is clear that if in-use motor vehicles met the emissions standards for CO through their useful life, the problems related to CO air pollution would be solved relatively soon through the operation of the Federal Motor Vehicle Pollution Control Program. The failure of in-use vehicles to perform in a way that is consistent with the intent of the emission standards appears to be due primarily to a lack of proper maintenance; surveillance testing of vehicles that were tuned-up prior to the emission test has shown that tuned-up vehicles have mean emissions that do comply with applicable emission standards, whereas vehicles that were tested in their as-is condition typically had mean emissions that exceeded some of the standards. Other factors affecting emissions performance are deterioration of the vehicles' emission control systems, real-world conditions that are not properly accounted for by the Federal standards and the associated testing and compliance programs, and tampering with emission control systems. Recent data on 1975 model year in-use vehicles indicate that CO emissions from such cars are in many instances substantially higher than had been anticipated. Similar problems have been encountered with 1976 model year vehicles. The cause for such high CO emissions has yet to be fully determined, but preliminary analysis suggests that a major factor in these high emissions involves maladjustment--whether accidental or purposeful--of idle mixtures and choke settings. Such problems are amenable to correction by State programs (i.e., by inspection and maintenance and anti-tampering programs, and mechanic training). EPA expects that with the implementation of assembly-line testing, an expanded recall program, the promulgation during the latter part of calendar year 1977 of short-tests that (in conjunction with inspection and maintenance programs) can trigger the warranty provisions of Section 207(b) of the Clean Air Act, and the eventual implementation of I/M programs, problems of maladjustment or tampering with vehicles will be reduced sharply, and the expected degree of emission control will be achieved in actual use. (It should be noted that in-use performance of emissions controls for HC and NO_x is not significantly different from that expected.)

The Agency's strategy for motor vehicles emissions control is to place the burden for compliance with emissions limitations, throughout the useful life of the vehicle, on the manufacturers rather than the owners of the vehicles. The Agency considers this the most effective point of control. To this end, EPA is assessing the reasons for in-use vehicle failure to meet emissions standards and will develop appropriate corrective measures. As an initial step in this direction, EPA has requested the manufacturers to correct deficiencies in the maintenance procedures followed by the service organizations in the country and to improve the manufacturers' recommended procedures for maintenance. EPA intends to concentrate more thoroughly on reviewing the appropriateness of manufacturers' maintenance instructions and intends to issue maintenance regulations which define guidelines for acceptable maintenance. The Agency also intends to expand its recall efforts to encourage manufacturers to produce complying vehicles and through this enforcement tool to foster greater maintainability of in-use cars. If warranted, EPA will set appropriate regulations and additional requirements under the certification process for prototype vehicles to correct deficiencies. It is expected that these actions will result in a much improved service industry capability for maintaining in-use vehicles according to manufacturers' specifications and, by improving vehicle design, will greatly increase the potential of vehicles for meeting emissions standards while in actual consumer use.

Although actions aimed at the manufacturers are expected to result in future improvements in newer model year vehicles insofar as in-use emissions performance is concerned, the totality of the vehicle population will not be impacted by the actions taken at the manufacturer level until approximately the early 1980's when new model years (incorporating emissions control features which reflect the need for in-use emissions performance that is improved over that currently experienced) start to replace the existing vehicle population. In addition, the Agency has no authority (except in the anti-tampering area) to take action for improving emissions performance for vehicles beyond 5 years or 50,000 miles since the Clean Air Act defines useful life at these levels. However, typical vehicles last approximately 10 years or 100,000 miles. Only in-use control strategies are effective for the control of vehicle emissions from vehicles that are more than 5 years old or have accumulated more than 50,000 miles.

It will only be in the late 1980's, at the earliest, that there will be a significant impact from the Federal certification efforts at improving in-use vehicle emissions performance. Additional action that can be taken to improve emission performance of the vehicles that will be on the roads up to that time will be in the area of improvements in the maintenance of vehicles, recall of vehicles, and anti-tampering activities. In this regard, State and local programs for improving maintenance of vehicles, including their inspection and mandatory maintenance if the inspection is failed, have a significant role to play.

Reducing emissions from in-use vehicles can be achieved by two types of actions: (1) Reductions in emissions by improved maintenance or vehicle modification (e.g., recall fixes or retrofitting) for achieving emission reductions from individual vehicles beyond those achieved by the Federal (or California, for that State) standards for new vehicles applicable to the specific model year, and (2) reductions in total motor vehicle emissions by reducing the use, or vehicle miles traveled (VMT)*, of all vehicles. VMT reduction measures, in general, require changes in established patterns with respect to use of privately owned passenger cars. Technological approaches to reductions in emissions from individual vehicles require no changes in vehicle use.

Given the present and projected status of attainment of the NAAQS with currently implementable new vehicle control strategies, the need for the imposition of additional transportation control measures exists. Some means of lowering VMT below current levels (and, for CO, reducing congestion) will have to be in effect in some AQCRs indefinitely. CO air pollution can be effectively reduced by the lessening of congestion and other actions aimed at vehicle use related factors in addition to inspection and maintenance, since CO is essentially a "hot spot" problem related to concentrations of motor vehicles generally traveling at speeds that are lower than average urban speeds. It is expected that

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* VMT reductions are an alternative total emissions control measure in addition to individual vehicle emission reductions, since total emissions are also a function of vehicle use as well as vehicle emissions.

States will address the non-vehicle emissions factors that affect CO air quality through the Metropolitan Planning Organizations (MPO) and transportation system planning processes. It is EPA's policy that new and revised transportation strategies be developed by transportation agencies, in coordination with air pollution control agencies, through the normal urban transportation planning process. It is expected that the SIP revisions will incorporate improved transportation plans that take into account the air quality impact of transportation-related sources.

c. Motor Vehicle Emissions Inspection and Maintenance

Motor vehicle inspection and maintenance (I/M) is a program of periodic vehicle emissions inspection and the mandatory performance of maintenance for those vehicles found to emit excessive amounts of a pollutant.* In a given metropolitan area with an inspection/maintenance program in effect, the latest estimates indicate that the vehicle fleet, on the average, will emit up to 50 percent fewer pollutants over several years than would be the case without such a program. Initial reductions of 24 and 37 percent are possible for HC and CO respectively. Depending on the particular mix of stationary and mobile sources in an area, inspection/maintenance can obtain at least 6 to 18 percent of the needed hydrocarbon reduction and 20 to 40 percent of the needed carbon monoxide reductions.*

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* The amount found to be excessive is determined by the locality or State carrying out the program. Emissions pass/fail points vary with the model year of the vehicle; this is to take into account the variations in the standards which the vehicles were built to meet.

Although I/M has not been widely implemented, largely due to doubts as to its benefits and inconvenience it may cause the public, the implementation of programs to date indicates their feasibility and illustrates their financially self-supporting capability. For example, in Arizona a franchised contractor operates the program for the State without State funds being utilized in program operation. In Arizona, as well as other areas, costs are recovered through inspection fees.

Given the need for achieving emission reductions of both CO and HC from in-use vehicles, I/M is the highest priority program for control of motor vehicle emissions under the SIPs. EPA considers this measure to be implementable and effective in reducing motor vehicle emissions and is proceeding with actions aimed at facilitating their implementation--mechanics' training is being supported; warranties for properly maintained and used vehicles are to be implemented; and additional technical support data are being developed.

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* By serving as a check to insure that vehicles are maintained properly throughout their lifetime, an inspection/maintenance program contributes to the goal of reducing fuel consumption by motor vehicles. The fuel savings to vehicles which are repaired in order to pass the inspection check can be significant--fuel consumption can be reduced by 4 to 10 percent on these cars.

d. Control of Stationary Sources

Essentially no problems are presented by stationary sources of CO. However, large amounts of hydrocarbons and other photochemically reactive substances are emitted to the atmosphere as a result of evaporation resulting from the storage, handling, use and transpotation of hydrocarbon-containing substances as well as from the chemical industry. Controls available for these emissions vary. Storage vessels can be constructed and operated in a fashion such that emissions are minimized and that economic benefits are accrued; an example of this type of control is the use of floating roofs on tanks used for storage of petroleum and petroleum products--net savings occur by keeping valuable products from evaporating. (New source performance standards for storage vessels require the use of floating roofs.)

Certain sources of organic substances, such as solvents (used for dry cleaning and in paints), can be controlled by using substitutes if they are available. Substitution of materials is based on the concept of reactivity, i.e., certain types of organic substances tend to more readily participate in photochemical reactions than do other types. Control is based on substituting the less reactive organics for those judged to be more reactive. (This approach has been extensively used in the Los Angeles area.) However, more recent understanding of the organics' role in photochemical reactions (i.e., all organic substances react photochemically if given sufficient time) indicates that the substitution of one type of organic substance for another on the basis of reactivity considerations cannot be considered as a long-term control strategy for oxidants control. The replacement of organic substances with other substance, e.g., water based paints, is an effective long-term strategy for reducing HC emissions. EPA will not allow credit in the SIP control strategy for substitution of less reactive organics for those considered to be more reactive.

The amount of control achievable by the foregoing techniques is generally not sufficient to assure attainment of the NAAQS. Additional, more effective controls must be implemented. These controls are generally the recovery or capture of the gases and their incineration or recovery for additional use. Current issues related to these means of control are the energy consumption aspects of some of these systems (i.e., incineration, with net energy losses and the use of scarce natural gas supplies) and the technical feasibility of the control of evaporative emissions from the refueling of motor vehicles. (It should be noted that process losses and transportation or transfer losses can also be minimized by the use of equipment and proper housekeeping procedures.)

One of the most significant control requirements currently in effect for the control of HC from stationary sources are those applicable to gasoline marketing. Gasoline vapor control regulations require the control of evaporative hydrocarbons emissions during the storage, transport, and dispensing of gasoline. Uncontrolled emissions from these operations account for about six percent of HC emissions in a typical AQCR, divided equally among terminal operations, gasoline delivery to service station storage tanks, and refueling of automobiles.*

Significant emissions reductions and fuel saving are ascribable to vapor recovery controls. Uncontrolled emissions from vehicle refueling are approximately equal to the hydrocarbons that will be emitted from the tailpipes of vehicles meeting statutory Federal standards. Controls on gasoline marketing operations will generally capture about 11 percent of the needed reductions of hydrocarbons in an urban area and may, in certain cases, capture as much as 20 percent of the needed reductions.

The control of evaporative emissions when gasoline is delivered to storage tanks at service stations is being implemented since available technology is simple and clearly capable of providing the requisite control. Likewise, control of terminal operations presents no technical issues. Issues related to control of evaporative emissions during refueling of automobiles are the imprecise definition of control requirements, lack of control equipment that has been adequately demonstrated in actual use, the absence of test and certification procedures, and the general risks (technical and financial) to be assumed by service station owners or operators. Technical issues are being resolved--EPA has reproposed the Stage II regulations for additional public review of the issues. It is EPA's policy to require earlier application of control measures by the larger gasoline marketers since they are generally better able to assume the risks associated with the installation of control equipment that is not yet fully proven in actual use.

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* In the EPA regulations, these controls are referred to as Stage I (for delivery to service station) and Stage II (for refueling of automobiles).

D. Attainment/Maintenance of Standards in Problem Areas and New Sources Control

1. Introduction

Practically all major urbanized or industrialized areas of the country are not meeting one or more of the NAAQS. Although there have been significant improvements in air quality both in terms of reductions in ambient concentrations of the pollutants and in terms of the number of times that the standards are exceeded, it is expected that the violations of the NAAQS will continue in the future. The principal issues currently related to air pollution control are those associated with the attainment of the standards and how to assure overall reduction in total emissions (and, eventually, attaining NAAQS), while at the same time allowing for necessary growth of industry, commerce, and services associated with population increases (e.g., housing, schools, entertainment facilities, transportation).

The Agency has focused planning for the future maintenance of standards on selected areas that will most likely require long-term planning, the Air Quality Maintenance Areas (AQMA). The planning that focuses on AQMA, however, will not solve the current attainment problems. Most growth will occur in areas currently above the standards--the issue is one related to growth in areas that have yet to attain the standards, not one of growth in areas that may have to be concerned with future air pollution problems. Growth must be handled in the context of attainment of the standards. As far as air pollution impact is concerned, growth considerations are limited to consideration of the impact on ambient air quality of changes in emissions from sources (e.g., new sources, changes in fuel use or industrial processes, increased production or capacity of existing sources, and increased motor vehicle use or congestion).

Air quality standards attainment issues often require complex, long-term solutions. The air quality planning process provides the tools to address these long-term problems. The solution to such problems as growth in emissions involves tradeoffs that cannot always be adequately assessed on a case-by-case basis and must be viewed within the larger framework of community goals. The support of the community is necessary to implement complex control strategies. Many controls require a long lead time for development and implementation. All of this requires a systematic planning process.

EPA's policy is to address long-term problems, or plan revisions that may have wide-ranging effects on a community (be they related to attainment or maintenance), through the process specified in regulations stating the criteria for the revision of SIPs for the maintenance of standards. Any required plan revision (including revisions for attainment) can be developed using this process.

EPA's aim is the development of an air quality management process which would more explicitly establish the relationship among all air quality related requirements. This would be aimed at making trade-offs at the State and local levels, with citizen participation, among the various means of achieving the standards. EPA has established a flexible process for SIP revision so that State and community participation is assured and to permit the integration of all other planning requirements, such as 208 area-wide waste treatment management, coastal zone management, and transportation planning.

2. Development of a Comprehensive Planning and Decision-Making Process

For areas that have attainment problems, SIP revisions are generally required, and difficult choices as to new sources have to be made. For areas that have no significant attainment problems, actions will have to be taken to avoid future emission increases that would violate standards. After existing sources have reduced their emissions to the lowest practical level, further air pollution control can only be accomplished by implementing rational planning procedures for management of all new sources of air pollution. This will require extensive cooperation among the air pollution control community--regional, state, and local planning agencies; state and local governments; and the general public--in order to ensure that future growth plans include appropriate air quality considerations.

In addition, it should be noted that case-by-case review of new sources as to air quality impact usually cannot adequately provide for maintenance of the standards--such reviews alone would tend to ignore the cumulative impact on air quality of the sources which may be individually approved, and would not provide for consideration of the small individual (but, in the aggregate, significant) contribution of the types of sources that would not be subject to individual review. Furthermore, a source-by-source review procedure allocates the air resource on a first-come, first-served basis. For example, the first source to receive approval may preclude the later approval of all other sources in the future since the first source may have emissions sufficient to approach the NAAQS in a way that would preclude approval for any additional sources. A more rational allocation of the air resource requires more than a source-by-source decision making process.

The nature and magnitude of the restrictions necessary to implement the provisions of the Act requiring maintenance of standards will vary with the nature of the specific issue addressed, but determination of the nature of land use and an assessment of the air pollution impact of a variety of types of human activity are required. The maintenance of standards on a regional basis is to be achieved by the development and implementation of air quality maintenance plans for specific air quality maintenance areas (AQMAs) as a minimum. Plans must be developed for other areas with identified maintenance problems as well.*

The planning process requires a preliminary analysis of work that may be required to be carried out for plan development and, on the basis of this preliminary analysis, an agreement between states and EPA regional offices as to the timing of plan revisions. Issues that States and localities will have to resolve during the planning for attainment and maintenance of standards are related to (1) the development and implementation of a planning process that will lead to the identification and incorporation of all relevant factors affecting ambient air quality, and (2) the extent to which emission reductions can be adopted and implemented once identified. It is clear that a comprehensive air quality plan should incorporate consideration of all social and economic aspects of the affected areas. Rational control choices have to be made by the affected communities. It is EPA's policy to assure as widespread as possible participation in this decision-making process.

The success of air quality planning depends not only on the ability to control emissions but also on the ability to guide development in ways that will minimize the deterioration in specific areas and the expected long-term growth in emissions. Location decisions for major pollution sources such as power plants and industries must be checked carefully for their air quality effects; existing regulations are aimed at doing this. More difficult to take into account, however, are decisions on such matters as housing, sewer and water systems, and so on. Thus, to be effective in the long run, air quality planning must be a factor in decisions on land use, resource development, transportation, housing, and commercial and industrial development.

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* An "Air Quality Maintenance Area" is a sub-regional geographic area in which the maintenance of NAAQS is deemed to warrant special attention. When an AQMA is established, one or more pollutants are designated as having the potential of being in future violation of NAAQS. A regional-scale analysis of such potential violations is then carried out.

The Metropolitan Planning Organizations (or similar organizations), acting in coordination with air pollution control agencies, should have the principal responsibility for developing the transportation measures needed to achieve the ambient air quality standards. This activity should take place as part of the normal urban transportation planning process and should be oriented toward developing transportation plans and programs that are consistent with air quality requirements and other community objectives. Ideally, the transportation plans and programs developed through the urban transportation planning process should be adequate for inclusion in SIP's with no other transportation control measures required.*

3. EPA's Formal Planning Requirements

Regulations pertaining to the analysis and development of plans for Air Quality Maintenance Areas (AQMA's) were promulgated on May 3, 1976.** The regulations specify the procedures to be used in estimating future air quality concentrations and for developing any new control strategies necessary to ensure the maintenance of the national ambient air quality standards. They specify the approvable form and content of the analysis and plan revisions required in AQMAs and other areas identified by EPA. Although the procedures are aimed at the planning for maintenance of standards, they are generally applicable to air quality planning. At the Regional Administrator's discretion, these procedures can be applied to other areas in need of implementation plan revisions for attainment and maintenance.

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* On September 17, 1975, DOT issued the Transportation Improvement Program regulations which govern the planning and programming of Federally sponsored urban transportation improvements (40 FR 42979). The most significant air pollution control aspects of the DOT regulation are the requirements for the preparation of a Transportation System Management (TSM) plan and a short-range Transportation Improvement Program (TIP). The TSM plan is oriented toward making efficient use of existing transportation resources and providing for the movement of people in an efficient manner. It involves traffic engineering, public transportation, regulatory , pricing, management, and operational improvements to the existing urban transportation system, not including new transportation facilities or major changes in existing facilities. Examples of TSM measures are traffic flow improvements, preferential treatment of buses, parking management, pricing policies, and auto-free zones. The TIP is a staged 3- to 5-year program of transportation improvement projects recommended for advancement during the program period. The TIP identifies priorities and includes estimates of program costs and revenues for the program period. In effect, the TIP is a plan for transportation improvements over a 3- to 5-year period. The TSM plan and TIP are developed by the Metropolitan Planning Organization (MPO) in each urban area. The MPO provides a forum for cooperative decision-making by principal elected officials of general purpose local governments.

** Federal Register, May 3, 1976, pages 18382 to 18391. These regulations modify key parts of Part 51 regulations and add a Subpart D, Maintenance of National Standards, to Part 51. Part 51 regulations set forth EPA's criteria for development and approval of SIPs.

Briefly, the process for developing a maintenance plan consists of the following tasks: Projecting emissions into the future; allocating emissions according to estimated projections of location of sources; calculating air quality resulting from the future emission pattern; developing a control strategy needed to maintain the national ambient air quality standards; and adopting regulations to make the control strategy enforceable.

The regulations leave in the hands of the States the choice of measures that are needed to maintain the national air quality standards. EPA's policy is to be flexible with regard to these plans to allow maximum consideration of varying local conditions. EPA will call for plan revisions for maintenance whenever their need is determined on a case-by-case basis. The time period for which maintenance is to be insured will also vary from area to area. The date by which such plan revisions are to be submitted will be determined by EPA in consultation with States. EPA requires a reanalysis of all areas of all States at least every five years to determine if any areas are in need of plan revisions.

The regulations require States to analyze air quality for 20 years. EPA Regional Administrators, however, have the authority to shorten the analysis period to no less than 10 years. Where long-range data are unreliable, the Regional Administrators can set a shorter period (at least three years) for the period over which a plan must demonstrate maintenance of the NAAQS. The analysis beyond 10 years is designed to foster awareness of existing State land use and transportation plans that extend beyond 10 years, so that the State can consider the air quality implications of these other plans. Additionally, the regulations limit EPA's discretion on acting on State requests for modification: The Administrator must act within 45 days of receipt of the request, or the request will be deemed automatically approved.

4. New Stationary Sources Review and Control

a. Introduction

A key element in the control of increases in emissions is reviewing the air pollution impact of new sources (or modifications of existing sources) prior to the time a commitment to construct or modify is made. Conceptually, the aim of new source review is to assure that the proposed source's impact on air quality does not interfere with the attainment or maintenance of the NAAQS or other ambient air quality goal (e.g., the prevention of significant deterioration of air quality).* New sources have basically two options under a new source review process. They can either meet emissions limitations that are consistent with the air quality goals that are applicable to the proposed location of the source (sometimes derived during the review process), or they can select an alternative site where air quality is not a problem or control needs are less. In order to consider decisions on new sources in their proper social and economic as well as air quality context, EPA's policy is one of encouraging the development of appropriate decision-making processes at the State and local level. The policies for developing comprehensive plans were discussed above. Policy decisions on new sources in nonattainment areas are discussed below.

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* Of course, new sources also have to comply with all other emission limitations, such as New Source Performance Standards or hazardous pollutant emission standards. New source reviews can also be carried out to verify compliance with these emission limitations.

State Implementation Plans are required by 40 CFR 51.18 to contain procedures for preconstruction review of new sources to assure that such sources will not cause violations of the ambient standards or any applicable control strategy. Most SIPs have approved State procedures (and State responsibility for action), while a few have provisions promulgated by EPA (and EPA is responsible for carrying out new source review).* Specific decisions on individual sources may require much technical analysis and the commitment of significant resources to comply with emission limitations.

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* New source reviews are generally administered through a permit system. Under such systems, a source applies for permission to construct or operate; the permit application generally includes data on the facility, its air quality impact, etc. The procedural outcome of a review, then, is the approval or disapproval of permission to operate or construct the facility.

In general, the first determination that must be made for a new source review is whether or not the source is covered by an applicable emission requirement and, if so, if it meets the limitation of that requirement. In those cases where the proposed new source will not meet the applicable emission requirements, a permit to construct must be denied.

If the appropriate emission limitations will be met, an air quality impact analysis is required for major sources. If the air quality impact analysis indicates that the source's emissions will not lead to the violation of the NAAQS or contribute to it, a permit to construct is issued. However, this presents a difficult situation for those areas of the country where NAAQS are currently exceeded. Arguably, no new source should be permitted in these areas since any increase in emissions could aggravate air quality problems.

b. New Sources in Nonattainment Areas-- "Emissions Offset" Policy

It is EPA's policy to allow the location of major new and expanded sources in areas where NAAQS are currently exceeded only to the extent that the resulting emissions do not exacerbate current violations of the primary standards and do not interfere with making reasonable progress toward the timely attainment of the standards.

EPA's policy, based on its conclusions as to the most flexible yet rational interpretation of the Clean Air Act's requirements, has been documented in an Interpretative Ruling.* This ruling addresses the issue of whether and to what extent national air quality standards established under the Clean Air Act may restrict or prohibit growth of major new or expanded stationary air pollution sources. The ruling provides in general that a major new source may locate in an area with air quality worse than a national standard only if stringent conditions can be met. These conditions are designed to insure that the new source's emissions will be controlled to the greatest degree possible; that more than equivalent offsetting emission reductions ("emission offsets") will be obtained from existing sources; and that there will be progress toward achievement of the standards. The reader is referred to the ruling itself for its specific provisions. While the ruling is effective now, EPA is actively soliciting public comment on the ruling's basic policies and detailed provisions. (EPA also intends to modify the Part 51 regulations, specifying SIP requirements, in keeping with this ruling.)

c. Prevention of Significant Deterioration of Air Quality

The Clean Air Act requires the prevention of significant deterioration of air quality in currently clean areas. EPA has promulgated regulations which implement this requirement of the Act. (Final regulations were promulgated on December 5, 1974.) EPA's requirements are implemented through a new source review procedure. In developing its implementing regulations, EPA had to decide what degree of air quality deterioration would be considered "significant" since there has been no specific judicial or Congressional guidance. In areas having very clean air, it was not possible to set standards based on any measurements of damage to the public health and welfare. On the other hand, it was the intent of the law to prevent air quality everywhere from being uniformly degraded through a "leveling out" of the Nation's air pollution. The EPA regulations seek to define "significant" in a reasonable way that will allow for protection of clean areas and for national economic growth. Any growth that occurs will be with the application of best available control technology.

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* This ruling was published in the December 21, 1976 Federal Register, pages 55524 to 55528. This ruling interprets the way in which the requirements of 40 CFR 51.18 are to be implemented.

For purpose of implementation, the country will ultimately be divided into three types of areas:

Class I--regions where practically any air quality deterioration would be considered significant.

Class II--regions where deterioration in air quality that would normally accompany moderate, well-planned growth, would not be considered significant.

Class III--regions where intensive major industrial growth is desired.

The benchmarks to be used in judging the impact of new sources on clean areas are increments of ambient concentrations of total suspended particulates and sulfur dioxide. The start for assessing source impact against these increments was January 1, 1975. These increments for areas are:

Area Classification*	TSP (μg/m3)		SO_2 (μg/m3)		
	Annual	24 hr.	Annual	24 hr.	3 hr.
Class I	5	10	2	5	25
Class II	10	30	15	100	700

Issues related to these regulations concern industrial development and impacts of development in Class III areas on surrounding Class I or II areas. EPA believes that normal, orderly growth is possible within the framework of the regulations. The air pollution limit for a Class II area, for example, would (under normal circumstances) permit construction of any of the major source categories listed below. In a Class III area, an aggregation of major industrial projects may be constructed as long as air quality standards are not exceeded. (These standards must be met everywhere even in the absence of these regulations.)

The increments for Class II areas were developed taking into account the impact that they would have on industrial development. The Class II increment will permit construction and operation of major, economically sized industrial facilities. The increments do place constraints on control technology requirements and siting considerations.

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* Class III areas would be allowed to reach the levels of the most restrictive NAAQS.

None of the limitations in spacing of plants would lead to a general prohibition on industrial growth.

EPA has initially designated all areas of the country as Class II. Under the EPA regulations, the States (including sovereign Indian governing bodies) may request redesignation of an area to Class I or Class III. (Managers of Federal land, however, may request designation only from Class II to Class I.) The redesignation of an area may be necessary to achieve the social, economic or environmental objectives of its population or of the Nation as a whole. The regulations give the primary decision-making responsibility to the States to help them achieve their various objectives. The area reclassification process is expected to be similar to the process for public participation for development of maintenance of NAAQS plans.

Apart from the reclassification process, which is a planning and decision-making process, compliance with the regulations is strictly a new source review procedure; new sources can be approved until the point that the air quality increments applicable to an area are exhausted. In case that the air quality increment is exhausted, an area can be reclassified if additional growth in emissions is desired. However, at no time can the NAAQS be exceeded.

The prevention of significant deterioration regulations require the application of BACT for major source categories as a condition for the permit to construct: Fossil-fuel steam electric plants of more than 1,000 million B.T.U. per hour heat input; coal cleaning plants; kraft pulp mills; portland cement plants; primary zinc smelters; iron and steel mills; primary aluminum ore reduction plants; primary copper smelters; municipal incinerators capable of burning more than 250 tons of refuse per day; sulfuric acid plants; petroleum refineries; lime plants; phosphate rock processing plants; by-product coke oven batteries; sulfur recovery plants; carbon black plants; primary lead smelters; fuel conversion plants; and ferroalloy production facilities.

EPA believes that decisions about development of affected areas should not be based only on environmental factors. For this reason, as long as proper procedures are followed and decisions are not arbitrary or capricious in light of the relevant factors, State and local decisions about whether to reclassify an area to Class I (minor development) or Class III (whatever development the air quality standards will allow) will not be questioned.

d. Federal New Source Performance Standards (NSPS) for Criteria Pollutants

The setting of performance standards for new sources is authorized under Section 111 of the Act. NSPS prevent or reduce the magnitude of increases in emissions from stationary sources resulting from expanded industrial activity and/or new or modified sources, provide a mechanism by which the Federal Government determines (and makes available to States) the feasibility of control for emerging industries (i.e., defines BACT), and provide the only means for control of stationary sources of selected pollutants for which a NAAQS or hazardous pollutant designation is not applicable.

The setting of NSPS must (as required by the Act) take into consideration the costs of achieving the emission levels to be required. Therefore, issues related to the NSPS largely revolve around the standard-setting process rather than source compliance with emission limitations. In general, the courts have upheld the NSPS challenged to date.

As indicated earlier, the prevention of air pollution problems due to future growth in hydrocarbon emissions and nitrogen oxide emissions is highly dependent on the controls that are to be applied to new sources of these pollutants. The problem related to NO_2 is currently of low significance; only five AQCRs are classified as requiring emission controls. However, there is a clear danger that increases in emissions due to expanded economic activity will lead to widespread NAAQS violations by the 1980s unless new sources are controlled. The current control philosophy for mobile sources emissions stresses the need for stringent NO_x controls in the 1980s; a complementary program for the control of stationary sources is required. The setting of standards for new sources now is preferable to the setting of control requirements under the SIP process later in order to prevent the possibility of widespread NAAQS violations in the future. The need to prevent increases in emissions of hydrocarbons for new stationary sources is similar to the need for such control of NO_x. NSPS to be set in the future concentrate on sources of these pollutants. The sources covered by NSPS and sources in the process of, or under consideration for, being covered are listed in Appendix B.

Procedural requirements applicable to sources covered by NSPS are minimal. In brief, compliance with emissions limitations is required as well as compliance with certain self-monitoring requirements. State* or EPA enforcement of NSPS entails maintaining surveillance over sources covered, preconstruction review at the request of the source owner or operator, observation of source tests and evaluation of results, and enforcement proceedings against sources found not to be in compliance. EPA involvement with delegated NSPS entails the monitoring and evaluation of State enforcement progress, making determinations on how the standards are to be applied, the provision of technical advice and support, and, if needed, direct enforcement action.

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* EPA may delegate to States the enforcement of NSPS. It is the policy to delegate the authority to enforce these standards to the States whenever States meet requisite criteria, i.e., the State submits a plan for enforcement of the NSPS and EPA approves it.

III. The Control of Other Than Criteria Pollutants

A. Introduction

The Clean Air Act provides various mechanisms for the control of pollutants depending on such factors as their effects, the types of sources that emit them, and the best means of controlling them. The preceding discussion dealt with those pollutants for which criteria have been issued and NAAQS set. This part of the discussion outlines the controls in effect or projected for pollutants not controlled by NAAQS. For pollutants emitted from less widespread sources or a limited class of sources, or having limited effects, possible control mechanisms are provided by sections 112 (hazardous pollutants), 111(d) (control of air pollutants not covered by NAAQS and not determined to be hazardous under section 112), and section 211 (regulation of fuels, for control of pollutants which are emitted as a result of having been incorporated into motor vehicle fuels).*

Pollutants with significant localized effects are of concern to EPA. It is EPA's policy to proceed as expeditiously as possible with control actions, under the most appropriate authorities of the Act, for the control of those pollutants which present a significant risk to health or welfare and those pollutants for which Federal action is the most effective means of control. (It should be noted that there are cases for which State action is appropriate in the absence of Federal action; States are encouraged to utilize their authorities for the control of air pollutants whenever warranted.) For those pollutants for which Federal control action is appropriate, the philosophy of the Act requires primary Federal action for the control of sources of hazardous air pollutants, with provisions for delegation of enforcement responsibilities to the States. Furthermore, the Act requires primary State action for the control of existing sources of the pollutants controlled under section 111 *(based on EPA guidance) with a secondary Federal role thereafter, i.e., EPA action is required only upon State failure to act.

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* Pollutants controlled under these authorities are generally known as "noncriteria" pollutants, i.e., not covered by criteria documents issued under section 108 of the Act. Only TSP, SO_2, CO, O_x, NO_2, and HC are covered by criteria documents. There are additional authorities related to non-criteria pollutants under section 119(d) (3) (B). These authorities are limited to prohibition orders issued by FEA for the use of coal and are of limited applicability. They are not discussed here.

If a pollutant is of such a hazardous nature that immediate abatement of emissions is desired from both existing and new facilities (i.e., the Administrator of EPA finds that there is no applicable ambient air quality standard and the pollutant, in the judgement of the Administrator, causes or contributes to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness) then direct Federal control under section 112 is indicated. Under Section 112, all new sources are subject to control immediately upon promulgation of standards by EPA, and all existing sources are to be in compliance within 90 days of the EPA action unless granted waivers.

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* But not controlled by NAAQS or NESHAP.

Where a non-criteria pollutant is not hazardous (as that term is defined by section 112), i.e., it has a lower potential for impacting public health, then section 111 would be the mechanism for action. Pollutants emitted by only specific sources may be controlled under the provisions of section 111 by the setting of performance standards for new sources; if such a standard is set for a pollutant not covered by criteria and not determined to be hazardous under section 112, then existing sources of the pollutant are to be controlled by the States (or, in the absence of State action, by EPA) subsequent to the issuance of NSPS by EPA. Under section 111(d), States prepare plans for the control of existing sources under a process similar to the State Implementation Plans.

B. National Emission Standards for Hazardous Air Pollutants

Section 112 of the Clean Air Act requires the Administrator to establish national emission standards for hazardous air pollutants. A list of such substances (identifying asbestos,beryllium, and mercury as hazardous pollutants) was published in the Federal Register on March 31, 1971. In accordance with waiting periods and public hearing requirements of the Act, proposed regulations for their control were published in the Federal Register on December 7, 1971. Final regulations were promulgated April 6, 1973. Clarifying regulations were promulgated May 3, 1974, October 14, 1975, and March 2, 1977. Sources and pollutants covered by the NESHAP are listed in Table I.* EPA also has promulgated regulations to control emissions of vinyl chloride from facilities that manufacture both vinyl chloride monomer and polyvinyl chloride.* At this time benzene and organic compounds emitted from coke ovens are scheduled to be added to the list of hazardous air pollutants. In addition, investigations are currently underway for several pollutants to determine the optimum control option for each, which may include Section 112.

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* The regulations are contained under 40 CFR 61; a detailed explanation of the Agency's positions on the control of asbestos, mercury, and beryllium may be found in the April 6, 1973, Federal Register, 38 FR 8820, et. seq.

EPA Regional Offices are maintaining surveillance over sources, observing source tests and evaluating results, and carrying out enforcement proceedings against sources found not to be in compliance. These activities may be carried out by States when they are delegated enforcement authority, i.e., when they submit an acceptable plan for carrying out such actions. It is the Agency's policy to delegate enforcement authority to States; they are encouraged to develop programs for enforcing these regulations.

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* The regulations for vinyl chloride were published in the October 21, 1976, Federal Register (4 FR 46560 et. seq.).

Table I - Summary of NESHAP

Pollutant	Date	Applicable to:
Asbestos	4/6/73	Asbestos mills Roadway surfacing (asbestos tailings) Manufacturing of products containing asbestos (textiles, cement, fireproofing and insulating materials, friction products, paper, millboard, felt, floor tile, paints, coatings, caulks, adhesives, and sealants) Chlor-alkali manufacture Demolition
	10/14/75	Manufacture of shotgun shells and asphalt concrete Fabricating Waste disposal
Beryllium	4/6/73	Extraction plants Ceramic plants Foundries Incinerators Propellant plants Machining operations Rocket motor firing
Mercury	4/6/73	Ore processing Chlor-alkali manufacture
	10/14/75	Sludge dryers or incinerators
Vinyl Chloride	10/21/76	Ethylene dichloride manufacture by reaction of oxygen and hydrogen chloride with ethylene. Vinyl chloride manufacture Polymer manufacture via vinyl chloride

C. Control of Selected Pollutants

Section 111(d) of the Act provides a mechanism for the control of pollutants not covered by criteria (Section 108) or National Emission Standards for Hazardous Air Pollutants (Section 112). The Act provides that States set up a system for the control of existing sources of the non-criteria pollutants for which EPA sets NSPS. Sulfuric acid mist from sulfuric acid plants and fluorides from primary aluminum reduction and phosphate fertilizer plants are currently covered by this requirement.

The criteria to be used for developing State control programs require a separate rule-making action on the part of EPA. These separate State guidelines will specify the levels of emissions control that are achievable for existing sources and will provide guidance as to economic factors to be considered by the States in the development of control plans applicable to existing sources. States are to submit their control plans nine months after EPA promulgation of the guidance document.

D. Lead

EPA has chosen to control lead as a fuel additive since this is the most effective means of reducing environmental exposures: 90 percent of lead emissions to the atmosphere come from motor vehicles. The reduction of lead in gasoline is required under regulations issued under the authorities of section 211 of the Clean Air Act. These regulations are currently effective, EPA's position having prevailed after two years of litigation initiated by fuel additive manufacturers. (Another set of regulations set under Section 211, requiring the availability of lead-free gasoline for use in vehicles equipped with catalysts, is also in effect.)

Another court case has resulted in an order requiring the listing of lead as one of the air pollutants for which the EPA Administrator intends to issue criteria and NAAQS. EPA will issue a criteria document and proposed NAAQS for lead during August 1977.

E. Arsenic

Available ambient air quality data indicate that airborne arsenic is not a widespread air pollution problem. However, both air quality data and emission estimates indicate that substantial amounts of arsenic can be emitted during non-ferrous ore smelting operations. The need for emission standards is being investigated for the several smelter sites where a local problem may exist. Other sources of arsenic emissions do not appear to be a significant problem.

Because the air quality level and estimated emissions of arsenic around some non-ferrous smelters appear to be significant, regulatory action on arsenic may be necessary. However, the current data base is not comprehensive enough to support such action. Studies carried out by EPA should provide sufficient basis for and background upon which to make a decision regarding action on arsenic, with the decision for control action probably to be made in two years. In the interim, EPA will initiate studies to develop control technology information to be used in the regulation (if warranted) of arsenic emissions from smelters.

F. High Volume Industrial Organic Chemicals (HVIOC)

Increasingly, the industry viewed as a significant source of toxic and carcinogenic agents is that of the rapidly expanding manufacture of synthetic organic chemicals. EPA is aiming at widespread control of many types of organic pollutants through the use of new source performance standards (NSPS) under Section 111 of the Act. Section 111 can be used to cover most of the organic compounds which have potential adverse health effects in addition to those organics that contribute to the oxidant problem, i.e., setting NSPS for these sources will result in control for both criteria and non-criteria pollutant emissions. Significant emission reduction through this mechanism will require many years, but the growth of the chemical industry is rapid, replacement of obsolete processes is common, and new source standards represent a good start for control of emissions.

There are approximately 11,000 commercial organics currently marketed with hundreds of new compounds synthesized each year. An initial group of these chemicals has been selected for assessment as potential toxic atmospheric pollutants. (Table II lists these pollutants.) One of the 22, benzene, has been identified as a pollutant for which a more detailed assessment should be conducted in the near future. It is expected that such an assessment will be completed by the end of FY 1977. An additional group of substances, numbering about 700, is under review.

As a group, these materials are of concern as toxic agents, contributors to oxidant formation, and, some species (freons), as a threat to upper atmospheric stability. Wide ranging information gathering and engineering activities are underway in each of these areas. Emission standards are anticipated for several industries where emissions contribute significantly to oxidant formation. Although EPA has made studies to assess the impact of controlling freons, at this time evidence does not warrant control for these chemicals under the Clean Air Act.

Recent examples of chemicals causing concern from an air pollution standpoint include vinyl chloride and nitrosamines. Most of the members of the class of nitrosamine compounds are documented carcinogens in animals. Nitrosamine levels in the atmosphere have been found to be the result of direct emissions from a rocket fuel manufacturing facility and amine producing plants. They may also be produced in the atmosphere or in the body by reactions of nitrogen oxides and certain amine precursors. At present and over the near-term, efforts will be focused on the identification of sources of nitrosamines, their precursors,

Table II - High Volume Industrial Organic Chemicals Being Assessed for Air Pollution Potential

cresols
toluene
ethylene dibromide
trichloroethylene
perchloroethylene
vinylidene chloride
carbon tetrachloride
nitrobenzene
phthalic anhydride
Maleic anhydride
dimethyl terephthalate

acetylene
acrylonitrile
acetone
cyclohexanone
formaldehyde
methyl methacrylate
oxylene (1,3 dimethylbenzene)
methyl alcohol
adipic acid
ethylene dichloride
benzene

and techniques for control. Regulatory action for vinyl chloride was completed in October 1976.

Virtually all organic chemicals also are photochemically reactive, with some compounds reacting quickly to form oxidants while others react more slowly, thus causing oxidant problems many miles away. Many organic chemicals have the potential for reacting with other chemicals in the atmosphere or deteriorating to produce other potentially dangerous compounds. There is evidence that the combination of a number of these compounds in the atmosphere may cause synergistic effects or act as co-carcinogens.

In the short term, use of NSPS minimizes emission increases of pollutants which may already be a problem but have not been recognized, or for which documentation is not sufficient to initiate other regulatory options. In the longer term, the use of NSPS should result in substantial decreases in organic chemical emissions due to the rapid equipment replacement rate typical of the chemical industry.

G. Polycyclic Organic Matter

Ambient air concentrations of POM have been decreasing since 1966 as a result of control of smoke and general particulates.
The remaining significant source, coke ovens, may be controlled by Federal regulation under section 112 of the Act.

H. Polychlorinated Biphenyls (PCBs)

PCBs are primarily a human health problem due to their bioaccumulation in fish. Also of significance are the potential effects of PCBs on aquatic food chains. The significance of the air route of direct human exposure has not yet been assessed. These problems associated with PCBs may necessitate the control of selected sources of air emissions (e.g., transformer and/or capacitor plants) if current monitoring work confirms these plants as significant sources of PCBs. Such action may be required even with the stringent control of PCBs required by the Toxic Substances Control Act.

Municipal incinerators are also being investigated to determine their impact as sources of PCBs. Should these investigations confirm that they are significant sources, the upgrading of control systems for PCBs control will be quite costly and probably justifiable only on the basis of the control of a number of toxic organics, as opposed to control of PCBs alone. These control actions are also dependent on the success or failure of efforts to eliminate PCBs by substitution.

I. Cadmium

EPA is concerned over environmental loading of cadmium via the air route; however, even under the most pessimistic assumptions, it cannot be concluded that collective environmental exposure to all routes of body entry present a human health problem. The primary route of entry of cadmium to the body is through food ingestion. A secondary source is from inhalation of cigarette smoke. Inhalation of ambient air represents the least important route of entry to the body and it would require air concentrations five times those found under worst case conditions to be of concern to human health.

J. Manganese

Manganese does not present a human or environmental health threat at existing ambient levels and warrants no national regulatory program. However, EPA will reassess this conclusion if manganese becomes widely used as a fuel additive.

K. Other Trace Metals

Screening and assessment of other trace metals (chromium, nickel, selenium, zinc, copper, platinum, vanadium, iron, barium) is underway both through the National Academy of Sciences and within EPA. There is no evidence to date that would require control action for any of these materials at this time.

L. Odors

Odors are considered primarily a problem that should be handled by state and local authorities. With the exception of Federal emission standards for total reduced sulfur from pulp mills and sulfur recovery plants, no national regulatory program for odors is being pursued.

APPENDIX A

1. National Ambient Air Quality Standards[a]

Pollutant	Averaging Time	Primary Standards[b]	Secondary Standards[c]
Particulate matter[d]	Annual (Geometric mean)	75 $\mu g/m^3$	60 $\mu g/m^3$
	24-hour	260 $\mu g/m^3$	150 $\mu g/m^3$
Sulfur Dioxide	Annual (Arithmetic mean)	80 $\mu g/m^3$ (0.03 ppm)	--
	24-hour	365 $\mu g/m^3$ (0.14 ppm)	
	3-hour	--	1300 $\mu g/m^3$ (0.5 ppm)
Carbon Monoxide	8-hour	10 mg/m^3 (9 ppm)	Same as primary
	1-hour	40 mg/m^3 (35 ppm)	
Photochemical oxidants[e]	1-hour	160 $\mu g/m^3$ (0.08 ppm)	Same as primary
Hydrocarbons[f] (nonmethane)	3-hour (6 to 9 a.m.)	160 $\mu g/m^3$ (0.24 ppm)	Same as primary
Nitrogen Dioxide[g]	Annual (Arithmetic mean)	100 $\mu g/m^3$ (0.05 ppm)	Same as primary

a/ All standards (other than annual standards) are specified as not to be exceeded more than once per year. The measurement methods are also specified as Federal Reference Methods. The air quality standards and a description of the reference methods were published on April 30, 1971 in 42 CFR 210, recodified to 40 CFR 50 on November 25, 1972.

b/ Set for the protection of health.

c/ Set for the protection of welfare, which, in the words of the Act "includes, but is not limited to, effects on soils, water, crops, vegetation, manmade materials, animals, wildlife, weather, visibility, and climate, damage to and deterioration of property, and hazards to transportation, as well as effects on economic values and on personal comfort and well being." (Section 302 (b).)

d/ The secondary annual standard (60 $\mu g/m^3$) is a guide to be used in assessing implementation plans to achieve the 24-hour secondary standard.

e/ Expressed as ozone by the Federal Reference Method.

f/ This NAAQS is for use as a guide in devising implementation plans to achieve oxidant standards.

g/ No Federal Reference Method currently in effect.

2. Sources of Information on Health Effects of Air Pollutants

The following pubications provide information on the effects of air pollutants:

1. Air Quality Criteria for Particulate Matter, U. S. Department of of Health, Education, and Welfare, Public Health Service Environmental Health Service, National Air Pollution Control Administration, Washington, D. C., January 1969, Publication No. AP-49.

2. Air Quality Criteria for Sulfur Oxides, U. S. Department of Health, Education, and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Washington, D. C., Publication No. AP-50.

3. Effects of Sulfur Oxides in the Atmosphere on Vegetation; Revised Chapter 5 for Air Quality Criteria for Sulfur Oxides, National Environmental Research Center, Office of Research and Development, U. S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711, September 1973, EPA-R3-73-030.

4. Air Quality Criteria for Carbon Monoxide, U. S. Department of Health, Education, and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Washington, D. C., March 1970, Publication No. AP-62.

5. Air Quality Criteria for Carbon Monoxide, NATO Committee on the Challenges of Modern Society, Air Pollution Technical Information Center, Office of Air Programs, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, N. 10.

6. Air Quality Criteria for Photochemical Oxidants, U. S. Department of Health, Education, and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Washington, D. C., March 1970, Publication No. AP-63.

7. Air Quality Criteria for Hydrocarbons, U. S. Department of Health, Education, and Welfare, Public Health Service, Environmental Health Service, National Air Pollution Control Administration, Washington, D. C., March 1970, Publication No. AP-64.

8. *Air Quality Criteria for Photochemical Oxidants and Related Hydrocarbons*, Committee on the Challenges of Modern Society, North Atlantic Treaty Organization, Air Pollution Technical Information Center, Office of Air and Water Programs, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, U.S.A., N. 29.

9. *Air Quality Criteria for Nitrogen Oxides*, Environmental Protection Agency, Air Pollution Control Office, Washington, D. C., January 1971, Publication No. AP-84.

10. *Air Quality Criteria for Nitrogen Oxides*, NATO Committee on the Challenges of Modern Society, Air Pollution Technical Information Center, Office of Air Programs, Environmental Protection Agency, Research Triangle Park, North Carolina 27711, N. 15.

11. *Automotive Air Pollution and Human Health: A Seminar in Hartford, Connecticut*, October 1975, U. S. Environmental Protection Agency, Air & Hazardous Materials Division, Region I, Boston, Massachusetts, October 1975.

12. *The Health Implications of Photochemical Oxidant Air Pollution to Your Community*, U. S. Environmental Protection Agency, August 1976.

APPENDIX B

Summary of New Source Performance Standards

Date Effective*	Sources Covered	Pollutants Controlled	Affected Facility
August 17, 1971	Fossil fuel-fired steam generators	SO_2, NO_x & particulate matter	Each fossil fuel-fired steam generating unit of more than 250 million B.T.U. per hour heat input.
August 17, 1971	Incinerators	Particulate matter	Each incinerator of more than 50 tons per day charging rate.
August 17, 1971	Portland cement plants	Particulate matter	Kiln, clinker cooler, raw mill system, finish mill system, raw mill dryer, raw material storage, clinker storage, finished product conveyor transfer points, bagging and bulk loading and unloading systems.
August 17, 1971	Nitric acid plants	NO_x	Each nitric acid production unit.
August 17, 1971	Sulfuric acid plants	SO_2, acid mist	Each sulfuric acid production unit.
June 11, 1973	Asphalt concrete plants	Particulates	Process equipment.
June 11, 1973	Petroleum refineries	Particulates carbon monoxide and hydrogen sulfide	Catalyst regenerators fluid catalytic cracking units, process gas burners
June 11, 1973	Storage vessels for petroleum liquids	Hydrocarbons	Entire facility

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* The effective date for NSPS is that of proposal in the Federal Register. All affected sources that are being or have been modified or construction started as of this date must comply with the standards. Definitions of applicability of standards are contained in 40 CFR 60.

NSPS

(Continued)

Date Effective	Sources Covered	Pollutants Controlled	Affected Facility
June 11, 1973	Secondary lead smelters	Particulates	Furnaces
June 11, 1973	Secondary brass and bronze and ingot production plants	Particulates	Furnaces
June 11, 1973	Iron and steel plants	Particulates	Basic oxygen process furnaces
June 11, 1973	Sewage treatment plants	Particulates	Sludge incinerators
October 21, 1974	Electric arc furnaces	Particulates	
October 22, 1974	Phosphate fertilizer plants	Fluorides	
October 23, 1974	Primary aluminum plants	Fluorides	
October 21, 1974	Ferroalloy production	Particulates and CO	Electric submerged arc furnaces and dust handling equipment
October 24, 1974	Coal preparation plants	Particulates	
October 16, 1974	Non-ferrous smelters: copper, zinc, and lead	Particulates, SO_2	

Currently in process for NSPS-setting are the following:

Source Category	Pollutant
Lignite steam generators	NO_x, Part.
Grain terminals	Particulates
Kraft pulp mills	Part., odors*
Coal/refuse boilers	Particulates
Coke ovens - charging	Particulates
Sulfur recovery at refineries	SO_x and Particulates
Gas turbines	SO_x NO_x, HC, Part.
Chlor-alkali	Mercury
Crushed stone plants	Particulates
Degreasing	HC
Phosphate rock preparation	Particulates
Carbon black	HC, Part. CO
Iron & steel sintering	Particulates, SO_x
Gasification of fossil fuel	Particulates, SO_x
Stationary internal combustion engines	NO_x, HC, Particulates
Lime plants	Particulates
Coke ovens-pushing	Particulates, HC
Grey iron-electric arc furnaces	Particulates
Asphalt roofing	Particulates, HC
Sulfur recovery at oil fields	SO_x

Under consideration for action are:

Source Category	Pollutant
Boilers (3 sizes)	NO_x, particulates
Taconite beneficiation	
Wood waste boilers	
Motor vehicle surface coating	HC
Coal liquefaction	Particulates, SO_2
Ethylene oxide manufacturing	HC
Explosives	NO_x, SO_x, particulates
Charcoal manufacture	HC
Farm machinery surface coating	HC
Industrial machinery surface coating	HC

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* TRS, or total reduced sulfur, is to be controlled.

(Continuation)

Source Category	Pollutant
Commercial machinery surface coating	HC
Major appliances surface coating	HC
Dry cleaning	HC
Foundries-steel	Particulates
Auto body incineration	Particulates, HC
Cast iron boundry (Coke Ovens)	Particulates, HC
Coke ovens-pushing operations	Particulates, HC
Nylon acetate fibers	HC
Industrial/commerical incinerators	HC, Particulates
Plywood manufacture	HC, Particulates
Shale oil processing	SO_2, HC, TRS

APPENDIX C

Determination of Best Available Control Technology and Reasonably Available Control Technology

A. Best Available Control Technology

BACT is defined in 40CFR §52.01 (f) as follows:

The term "best available control technology," as applied to any affected facility subject to New Source Performance Standards, means any emission control device or technique which is capable of limiting emissions to the levels proposed or promulgated as NSPS. Where no standards of performance has been proposed or promulgated for a source or portion thereof, best available control technology is determined on a case-by-case basis considering the following:

(1) The process, fuels, and raw materials available and to be employed in the facility involved;

(2) The engineering aspects of the application of various types of control techniques which have been adequately demonstrated;

(3) Process and fuel changes;

(4) The respective costs of the application of all such control techniques, process changes, alternative fuels, etc.;

(5) Any applicable State and local emission limitations; and

(6) Locational and siting considerations.*

This definition is applicable to all EPA regulatory actions related to SIPs, specifically in relation to the use of tall stacks for new facilities and the prevention of significant deterioration of air quality.

B. Reasonably Available Control Technology

1. General

BACT may not always be applicable to sources, especially existing ones that require retrofitting under SIPs. For these cases, the Agency requires the application of RACT. At the present time, the concept of RACT is important in regard to:

- Determining whether existing SIP regulations are "adequate" or not.
- Determining whether a given overall control strategy represents the most comprehensive and aggressive control program that is reasonably practicable. This determination will be important as states develop and EPA reviews (or promulgates) SIP revisions in the actions scheduled for the period July 1976 to July 1978. When all RACT is applied, other measures are required to demonstrate attainment. If all RACT is not applied by a state, EPA

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* 40 CFR 52.01

would require the state to do so or will promulgate its own regulations.

. Determining when SCS or a tall stack may be used to prevent violations of NAAQS by existing sources.

The concept of RACT was involved in the SIPs developed in late 1971 and early 1972. It served as a basis for determining whether a State could be granted an 18-month extension of the date when plans to attain the secondary standards were to be submitted. If control measures more stringent than those defined as RACT were needed to attain secondary standards, an extension could be granted. To assist in creating an understanding of what RACT meant, a series of examples of emission limitations attainable by various source classes with RACT was prepared and was incorporated as Appendix B of 40 CFR 51. Appendix B was also used as one input in determining whether a two-year extension of the primary standards attainment date would be granted. If control technology needed to attain was not available soon enough to permit implementation in three years, an extension could be granted.

EPA is engaged in a number of projects to provide additional guidance and reference publications which will be useful in determining what RACT means in a wide variety of situations, and in making use of such information in conducting various air pollution control operations. These documents will be used in development of SIP revisions in the

July 1976 - 1978 time period. Specifically, the guides* for use in preparation of SIPs for several pollutants make reference to the various publications that can be used to acquire information on RACT. EPA expects these guides to be used as basic manuals (or references) in the SIP preparation process. They address policy, conceptual, and technical matters.

2. Specific Application of the RACT Concept

a. As an Aid in Defining BACT

The definition of BACT is based on either the applicable NSPS or (when no NSPS is applicable) a case-by-case determination (taking into account the factors listed under the BACT definition). When no NSPS is applicable, the availability of information as to what RACT is will provide a presumptive ceiling of emissions which could not be exceeded and still qualify as BACT and, in most cases, will provide assistance in determining how much lower than RACT the BACT limit might be.

The Agency has already developed specific criteria applicable to determinations of RACT for sources wishing to use tall stacks and/or

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* These guides document policy statements, technical information and guidance on control strategies relating to NOx, TSP, and oxidants. They include a discussion of the Agency's concept of RACT, describe procedural methods for determining RACT, and reference appropriate detailed guidance. It should be emphasized that much material is currently available on defining RACT. Support documents for emissions standards (NSPS and NESHAP) provide valuable reference documents for reaching a definition of RACT.

SCS, and in relation to the application of certain measures for oxidants and carbon monoxide controls. These policies are discussed below.

b. RACT Coupled with Tall Stacks and/or SCS*

In given instances, the technology envisioned by the BACT concept may be available in a state-of-the-art sense; however, its retrofit onto a specific existing source may be extremely onerous for economic reasons or ill-advised for engineering or siting reasons. It is expected that such instances will occur only in the cases of a few smelters and some power plants.

Where these circumstances do occur, particularly where a source is threatened with shutdown, the Agency believes that administrative relief can be considered. Accordingly, where a source demonstrates to the State (and the State thereafter demonstrates to EPA) that, as applied to the source, BACT is economically unreasonable or technologically unsound, EPA will approve a control strategy demonstration which, for that source, is based upon reasonably available (as opposed to best available) control technology coupled with unlimited stack height. However, such a control strategy will only be approved as a temporary measure for attaining and maintaining ambient air quality standards and is conditioned according to the tall stack and SCS policies.

For this purpose, RACT is not necessarily equivalent to the 40 CFR 51, Appendix B definition; RACT becomes a factor only after it has been determined, on a case-by-case basis, that retrofit of BACT on the existing source would be unreasonable. This requires that RACT be determined by considering the processes, fuels, and raw materials to be employed; the engineering aspects of the application of various types of control techniques, process and fuel changes; the cost of employing the available techniques; and the cost of certain control techniques due to plant location, configuration, basic process design and expected remaining life.

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*Extracted from EPA's Stack Height Increase Guideline, 41 F.R. 7450 (February 18, 1976).

Remaining life and capacity are major factors determining the reasonableness of an FGD installation for existing coal-fired power plants. For these plants, the following should be considered in determining reasonableness:

(i) Plant Life: If a plant has ten to fifteen years remaining life or less, and is projected to operate at an annual average of no more than 25 percent capacity, FGD installation might be considered unreasonable. In such instances, the source owner should provide the anticipated shutdown date, and that date must be included in the compliance schedule.

(ii) Space Limitations: FGD may be unreasonable due to space limitations.

In the event that it is determined on a case-by-case basis that FGD is not reasonable for a specific power plant, alternate control measures must still be considered. The use of low sulfur coal and coal washing, either separately or in combination, might be appropriate options and acceptable in meeting RACT criteria. The capital as well as operating costs of applying these control techniques are to be taken into account in making the case-by-case determination and, when the cost of using low sulfur coal is not significantly less than the cost of FGD, coal washing alone might be considered RACT.* Only after application of whatever measures are determined to be RACT would the source be able to take any credit for stack height increase.

In the case of existing smelters, BACT will, in most cases, be economically unreasonable and could, in some cases, result in shutdown. Under such circumstances, RACT will usually equate to control of all strong gas streams through properly operated and maintained double contact acid plants (or single contact acid plants where single acid plants are already on line). Where increased acid plant capacity is required to treat presently untreated strong gas streams, RACT for such gas streams must be double acid plants.

Since RACT involves a decision that is based principally upon economic and engineering considerations, the definition of RACT should be subject to future re-evaluation to determine if more effective control measures would be applicable.

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* The circumstances under which the use of low sulfur coal would be deemed to be unreasonable are expected to be extremely rare. EPA analyses indicate that low sulfur coal supplies are sufficient to accommodate demand.

C. Reasonably Available Control Measures for CO and O_x

EPA's guidelines for the development of control measures aimed at hydrocarbon and carbon monoxide sources* provide guidance as to "reasonably available" control measures in terms of the stage of SIP development and the severity of the air pollution problem. Reasonably available measures are:

Source Control Measures

i) Inspection/Maintenance
ii) Vapor Controls for Organic Solvents
iii) Petroleum Refinery, Chemical Plant and Other Industry Controls
iv) Vapor Controls for Gasoline Marketing
v) HDV Retrofits

Transportation Measures

i) Transit Improvement
ii) Employer Incentives
iii) Parking Management/ Restrictions
iv) Traffic Management/ Restraints

Every one of these control measures is considered reasonably available and should be included in SIP revisions where necessary for attainment.

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* Policies for the Inclusion of Carbon Monoxide and Oxidant Controls in State Implementation Plans (TCP Policy Paper), Office of Transportation and Land Use Policy, Office of Air and Waste Management, Environmental Protection Agency, December 1975.

However, the most cost-effective mix of measures must be locally determined. The policies governing the application of control measures are:

Policy for changing existing transportation and stationary sources measures included in Oxidant and Carbon Monoxide Control Strategies of SIPs:

EPA's policy is that revisions should be made to the existing transportation and stationary source control measures for O_x and CO in SIPs only if, on the basis of valid technical analysis, the measures are found not to reduce pollutant emissions. In this case, changes should be made. If states develop measures that are equal or better in effectiveness, in terms of reducing emissions, than are the reasonably available measures EPA promulgated, then such substitute measures should be adopted. (If standards cannot be attained by using the reasonably available source control measures promulgated by EPA, new State measures may supplement, but not replace, the EPA promulgated measures.)*

Policy for transportation measures being revised pursuant to court orders or for new transportation measures now being developed for addition to SIPs:

States are expected to adopt all reasonably available transportation control measures.

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* Gasoline rationing and catalytic retrofits for light-duty vehicles (included in some SIPs) are not considered reasonably available measures.

Policy for inclusion of transportation measures for non-attainment areas for which calls for SIP revisions are issued:

Reasonably available measures should be identified, and the State is to submit the required measures.

Policy for areas where transportation measures are included in SIPs and where standards will be attained by Clean Air Act deadlines:

Some areas to which transportation measures apply are not designated air quality maintenance areas. However, SIP revisions may be needed for standards maintenance. Needed SIP revisions should be determined through the analyses required for maintenance revisions.

APPENDIX D

Summary of States Issued Calls for SIP Revisions July 1, 1976, and Pollutants for Which Plan Revisions Are Required

	POLLUTANTS*				
State	TSP	SO_2	CO	O_x	NO_2
Alabama	x				
Alaska					
Arizona			x	x	
Arkansas	x				
California	x		x		x
Colorado	x		x	x	x
Connecticut	x	x	x	x	
Delaware				x	
District of Columbia	x		x	x	
Florida					
Georgia			x	x	
Hawaii					
Idaho	x	x			
Illinois				x	
Indiana				x	
Iowa	x				
Kansas	x				
Kentucky		x	x	x	

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* Where an "x" is shown, EPA has asked the State to revise its implementation plan for that pollutant for at least one area.

	POLLUTANTS*				
	TSP	SO_2	CO	O_x	NO_2
Louisiana	x			x	
Maine	x		x	x	
Maryland	x		x	x	
Massachusetts	x	x	x	x	
Michigan				x	
Minnesota				x	
Mississippi					
Missouri	x	x			
Montana	x	x			
Nebraska	x				
Navada			x	x	
New Hampshire	x		x	x	
New Jersey	x	x	x	x	
New Mexico	x	x	x		
New York	x	x	x	x	x
North Carolina			x	x	
North Dakota					
Ohio			x	x	
Oklahoma					
Oregon	x		x	x	
Pennsylvania	x	x	x	x	
Rhode Island	x	x	x	x	
South Carolina	x				

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* Where an "x" is shown, EPA has asked the State to revise its implementation plan for that pollutant for at least one area.

	POLLUTANTS*				
State	TSP	SO_2	CO	O_x	NO_2
South Dakota	x				
Tennessee	x			x	
Texas	x				
Utah	x				
Vermont			x	x	
Virginia			x	x	
Washington					
West Virginia	x			x	
Wisconsin				x	
Wyoming	x				
American Samoa					
Guam					
Puerto Rico	x	x			
Virgin Islands					

* Where an "x" is shown, EPA has asked the State to revise its implementation plan for that pollutant for at least one area.

APPENDIX E

List of Abbreviations, Symbols, and Acronyms

AQCRs	Air Quality Control Regions
AQMA	Air Quality Maintenance Area
AQMP	Air Quality Maintenance Plan
BACT	Best Available Control Technology
BOAs	Basic Ordering Agreements
CFP	Clean Fuels Policy
CO	Carbon monoxide
DOT	(U.S.) Department of Transportation
EPA	(U.S.) Environmental Protection Agency
FEA	Federal Energy Administration
FGD	Flue gas desulfurization
FMVCP	Federal Motor Vehicle Control Program
FRM	Federal Reference Method
FY	Fiscal year
GVW	Gross vehicle weight
gm/m	Grams per mile
HC	Hydrocarbons
HQ	Headquarters (EPA)
MPO	Metropolitan Planning Organization
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants

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NO_x	Nitrogen oxides
NO_2	Nitrogen dioxide
NSPS	New Source Performance Standards
O_x	Total oxidants
RACT	Reasonably Available Control Technology
SCS	Supplementary Control Systems
SIPs	State Implementation Plans
SMSA	Standard Metropolitan Statistical Area
SO_x	Sulfur oxides
SO_2	Sulfur dioxide
TCPs	Transportation Control Plans
TIP	Transportation Improvement Program
TRS	Total reduced sulfur
TSM	Transportation System Management
TSP	Total suspended particulates
VMT	Vehicle miles travelled
$\mu g/m^3$	Micrograms per cubic meter